

NOVEMBER 1961

ROCK

PRODUCTS



SPOTLIGHT
ON
LIGHTWEIGHT
AGGREGATES
(see Contents page)

Lodge constructed of lightweight structural concrete

Higher output on FINE GRINDING ..20 to 400 mesh.. with WILLIAMS ROLLER MILLS

A Williams does the entire job in a single continuous operation—from feed through grinding, blending, drying and classifying!

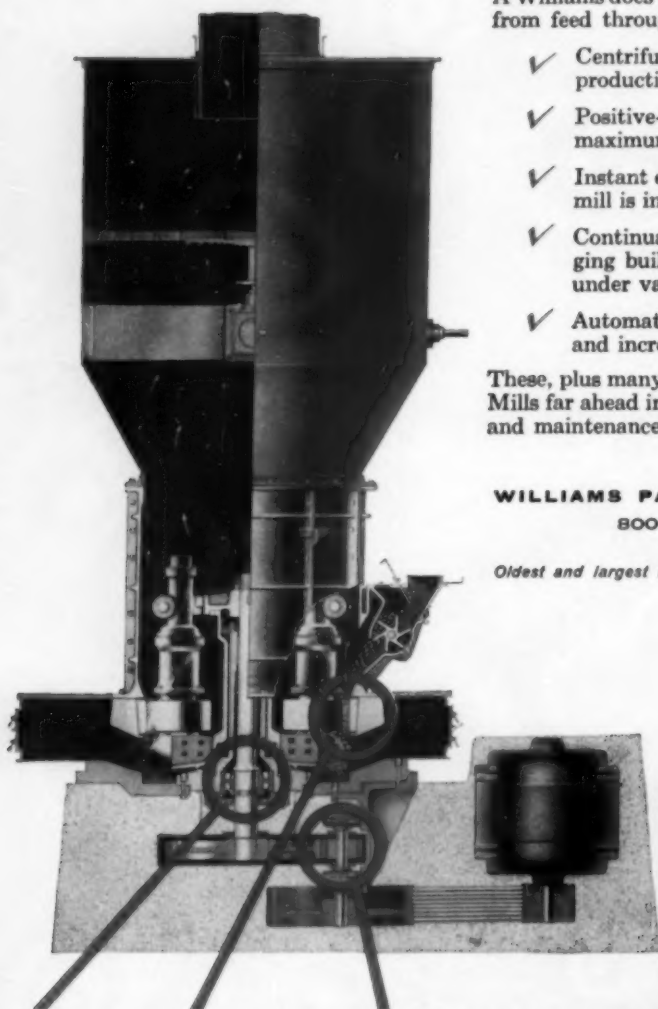
- ✓ Centrifugal grinding roll action against bull ring keeps production high—automatically compensates for wear
- ✓ Positive-flow feed control is self-adjusting—maintains maximum capacity of mill
- ✓ Instant external fineness adjustment can be made while mill is in motion
- ✓ Continual upward air sweep to classifier prevents clogging build-up of finely ground material. Mill operates under vacuum to insure dustless operation.
- ✓ Automatically controlled hot air is available for drying and increased output of moist material.

These, plus many other advanced features keep Williams Roller Mills far ahead in higher production, lower costs, less downtime and maintenance. *Write for catalog.*

WILLIAMS PATENT CRUSHER & PULVERIZER CO.

800 St. Louis Ave. • St. Louis 6, Mo.

Oldest and largest manufacturers of hammer mills in the world



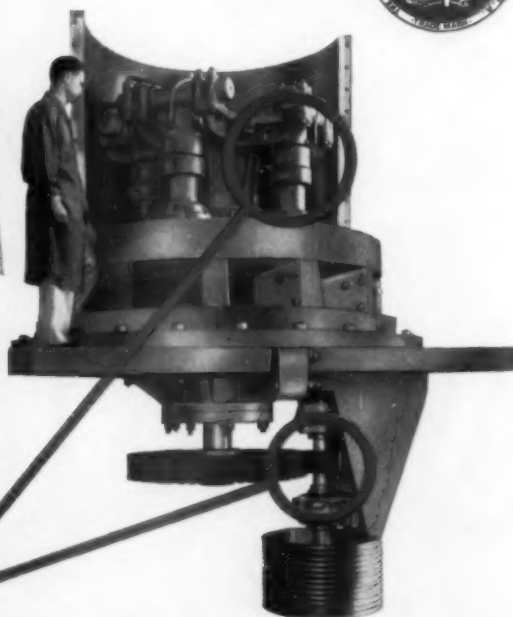
Troublesome alignment is greatly simplified and far less frequent with only 2 bearings on main shaft; the bottom one carrying both radial and thrust loads.

From here, material pulverized by rollers against bull ring are air-lifted to classifier which passes correctly sized product and returns coarse material for regrinding.

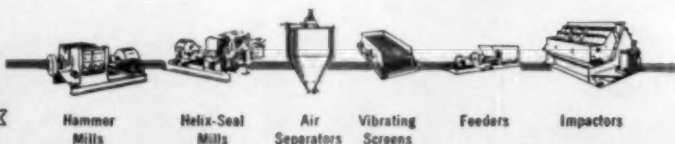
Exclusive! Only Williams has longer-life SPUR GEAR or GEARLESS DRIVES that eliminate expensive bevel and other hard-to-maintain gears. Standard and larger models have rugged spur gear and pinion drive—smaller models have direct motor-to-shaft V-belt drive requiring no care or lubrication.

"Giant" mill with cover section off show roller journals which suspend grinding rolls on bearings sealed against dirt and grit. Note wear-resistant steel forged bull ring.

Housing is also removed to show rugged spur gear and pinion drive. Easy, quick accessibility for service is another Williams time and money-saving feature.



WILLIAMS
CRUSHERS GRINDERS SHREDDERS



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Another of the
invisible extras that
insure the precision performance
of LINK-BELT roller chain

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Precision is *rigidly practiced* in every step of Link-Belt's roller chain production. The optical comparator is an example of the specialized equipment used to assure precise manufacturing control of chain parts and tools. It is capable of magnification up to 100 times.

Continuous inspection is just one of the *invisible extras* that contribute to the greater strength and endurance of Link-Belt roller chain. Others include precise heat-treat control, prestressing,



Double- and triple-strand LINK-BELT steel roller chains easily handle the heavy loads encountered by this storage table drive.

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These features—plus painstaking precision in every step of manufacture—assure you of chain that can easily cope with today's heavy loads and high drive speeds.

For engineering assistance in applying industry's preferred roller chain, contact your nearest Link-Belt office or authorized stock-carrying distributor. See CHAINS in the yellow pages of your phone directory.

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ROCK PRODUCTS, November, 1961

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1

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PRODUCTS

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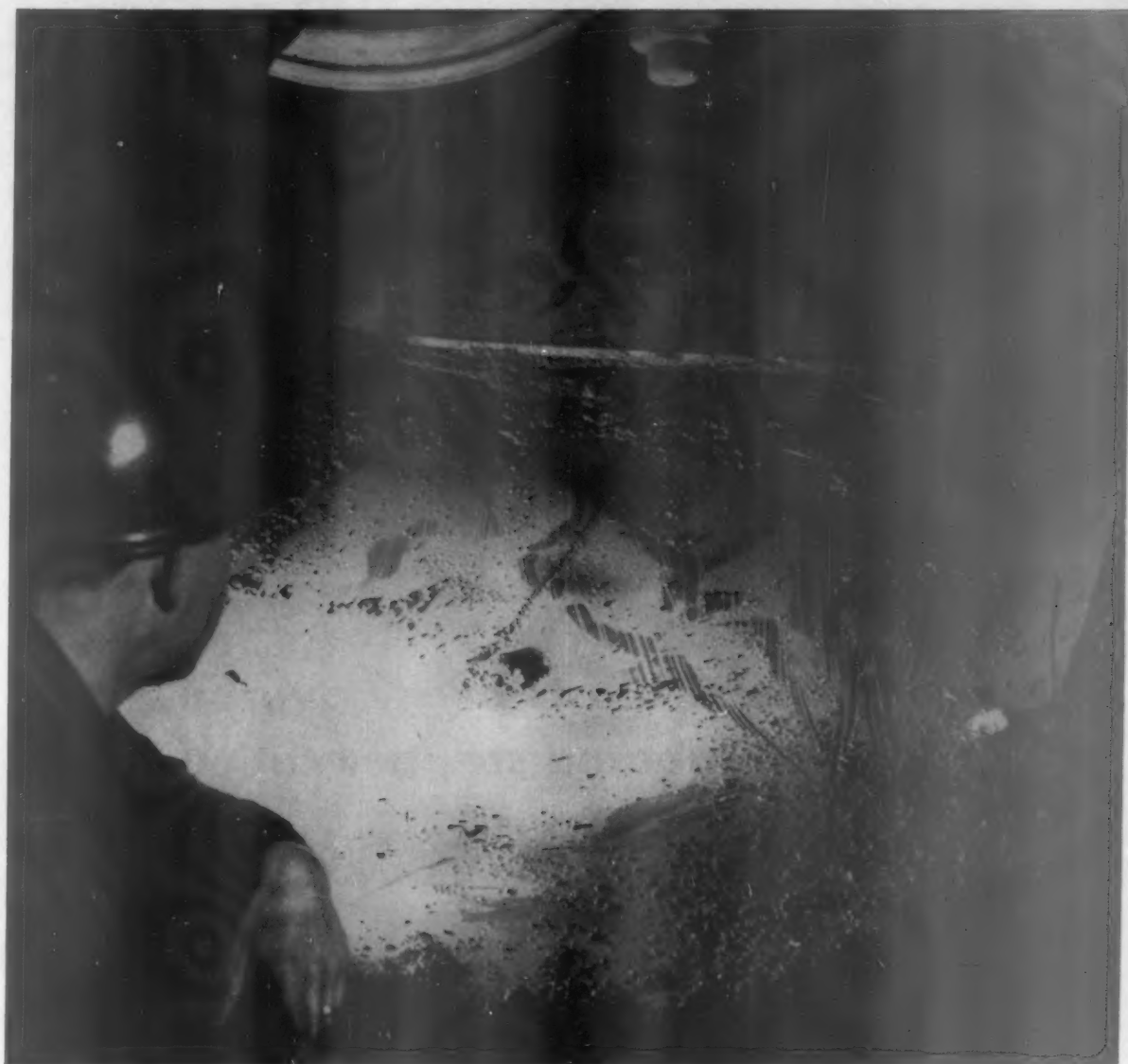
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Where rubber outlasts steel 5 to 1

B.F. Goodrich lining reduces chute maintenance costs by two-thirds

YOU quarry men can sympathize with this abrasion problem. Two thousand tons of coal a day cascade down that 21-foot chute and into the coal breaker. At first, the chute was lined with $\frac{3}{8}$ " thick steel plates for protection. But the pounding, grinding action of the chunky coal cut through the plates in 4 to 6 weeks. The frequent replacements were costly. Welding the plates onto the chute was troublesome.

When a B.F. Goodrich distributor heard of the problem, he recommended that the chutes be lined with Armorite,

a rubber especially compounded by B.F. Goodrich to stand terrific abrasion. Armorite is tough, yet soft so the jagged chunks of coal bounce off it, even though they hit with great force.

Installing it was simply a matter of bolting it to the chute. Result? Instead of lasting just a few weeks, Armorite took the wear and tear for more than 5 months, carried 260,000 tons of coal, reduced chute maintenance costs by at least two-thirds.

B.F. Goodrich Armorite can be used in dozens of ways—as a liner, curtain or throw mat for protection against abra-

sives. Can be ordered with or without a reinforcing back of fabric, fiber or steel.

Your B.F. Goodrich distributor has full information. And, as a factory-trained specialist in rubber products, he can answer your questions about any of the products BFG makes for industry. B.F. Goodrich Industrial Products Co., Dept. M-201, Akron 18, Ohio.





90 feet of overburden was blasted away at this site to expose the seam of bituminous coal, which has been removed. For top efficiency and economy, this Alabama

operator uses a mixture of Spencer N-IV ammonium nitrate and 6% No. 2 diesel fuel oil to break up the overburden.

Spencer AN/FO blasts away overburden ... helps Alabama stripper cut costs



Blasting superintendent Virgil Phillips pours a charge of Spencer N-IV and 6% No. 2 fuel oil into a blast hole. A half pound of AN/FO will remove an average cubic yard of overburden.



Hard sandstone and shale overburden is pulverized by the blast. This 17-yard shovel then exposes the seam 90-feet below the surface.

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Low-cost N-IV Ammonium Nitrate/fuel oil mixture provides top blast efficiency

The Robbins Coal Company of Oneonta, Alabama, has been successfully strip mining a seam of coal that lies under 90 feet of hard sandstone and shale. To break up this overburden, they rely on Spencer N-IV Ammonium Nitrate/fuel oil mixture. Less expensive than dynamite, the Spencer AN/FO is easy to handle, safe to store.

Current procedures call for a series of 40-foot holes nine inches in diameter. Holes are spaced in rectangles of 25 x 27 feet. Each is filled with 500 lbs. of the Spencer N-IV/fuel oil mixture. An average blow will set off a series of 32 holes. After blasting, a large shovel clears the overburden.

No secondary blasting is needed because Spencer N-IV/fuel oil mixture gives such excellent fragmentation. This superior blast is the result of the special prill structure of N-IV which absorbs oil more easily, and the extra high percentage of ammonium nitrate in the compound.

For complete application data on Spencer N-IV, write Spencer Chemical Company, Industrial Chemicals Division, 407 Dwight Building, Kansas City 5, Missouri.

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GET A NORTHWEST!

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Here is another of the many Kentucky pits that depends on Northwest Shovel Equipment to keep ahead of the crushers. Ohio River Stone Co. of Louisville has been using Northwests since 1949, and this 80-D is the seventh Northwest they have bought.

Shovels are bought to handle rock! Ripping through hard material takes smooth control *and power!* Your operator needs the "feel" he gets with the Northwest Dual Crowd and the Feather-Touch Clutch Control. *Put him on a Northwest!* Give him the shovel that has *speed, power, endurance.* Give him the shovel with the Dual Independent Crowd that utilizes force most independent crowd shovels waste. Give him the smooth, fast swing that comes with the Northwest Uniform Pressure Swing Clutches.

Watch a Northwest at work—talk with Northwest owners. Keep posted on Northwest equipment. Let a Northwest man bring you up to date on the new Northwest features.

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Cubic Yard Capacity

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Capacity

PULLSHOVELS

3/4 Yd. to 2 1/2 Yd.
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TRUCK CRANES

25-Ton and 45-Ton
Capacity

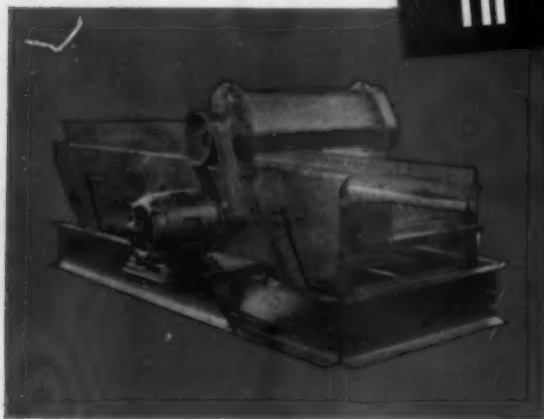
With a 24-year old profit-maker like the

CEDARAPIDS HORIZONTAL VIBRATING SCREEN

We don't change the design...we improve it!

Twenty-four years ago, Cedarapids came up with a winner . . . a *horizontal* vibrating screen designed to replace the crude inclined and revolving screens of the day with higher capacities, more accurate gradation and longer life. This design was so successful and so efficient that we've never changed its proven principle of operation. Today, the only change from the horizontal screen we offered the industry in 1937 is 24 years of constant improvements and refinements in the basic screen unit components to make modern Cedarapids Horizontal Vibrating Screens the standard of the industry, followed and imitated by others but never surpassed for meeting specifications with high tonnages at lowest cost.

in 1937...



Here is one of the first Cedarapids Horizontal Vibrating Screens ever made. It looks almost like the modern, highly refined model shown above. The only difference between these "look-alikes" are the hundreds of engineering refinements and improvements in manufacturing methods that have been incorporated in the basic design over the years. And today, Cedarapids offers these modern, improved profit-makers in 10 sizes . . . in single, double and triple deck models; with a variety of screen deck arrangements or special ball-deck fine mesh styles; with or without washing attachments . . . to meet your screening requirements profitably. Your Cedarapids Dealer can help you select the model and style you need. Call him today.

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Cedarapids, Iowa

Gentlemen: Please send Bulletin CS-6 which contains the newest developments and improvements in Cedarapids horizontal vibrating screens.

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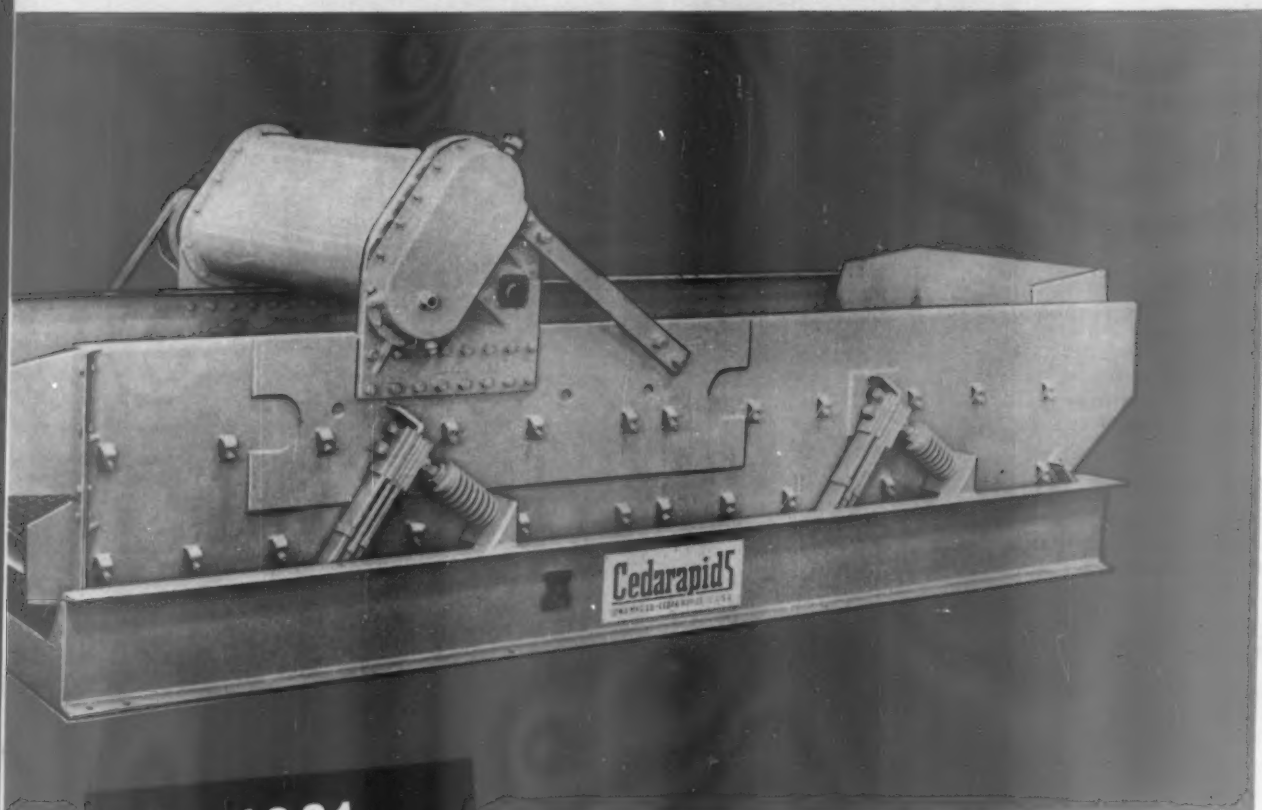
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Find out why
Cedarapids' continual
engineering research
gives you the
world's most efficient
screen



SEND FOR BULLETIN CS-6 TODAY

S1761W



in 1961...

These are a few of the many improvements and refinements which have been engineered into Cedarapids Horizontal Vibrating Screens in recent years . . .

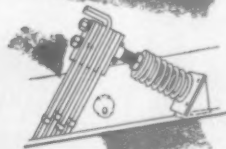
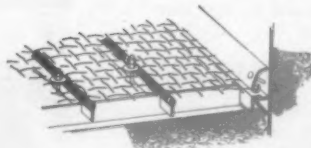
STRONGER, LIGHTER, BALANCED SCREEN BOX—Fully stress-relieved weldments on screen boxes and screen cloth support frames give Cedarapids screens 2 to 5 times greater strength and longer life than non-heat-treated units. All-welded construction eliminates the need for rivets. Boxes are built in fixtures, under precision quality control standards, to assure the perfect squareness that holds cloth tight and at even tension.

SCREEN WIRE TIGHTLY MOUNTED, EASILY CHANGED—Crowned frames allow the Cedarapids-built Ioweave screen cloth to be stretched tight against the special rubber deck mat and prevent pounding of the cloth against the frame. Clamp bars hold the screen cloth tight and also make changing of the cloth fast and easy.

FEED BOX ABSORBS SHOCK, INCREASES SCREEN LIFE—Cedarapids' correctly designed spreader feed box absorbs the shock of dumped rock and distributes the material evenly over the full width of the screen. Spreading of material quickly removes fines in the first few feet of screen area. Screening capacity is increased as cloth wear is reduced.

VIBRATING DRIVE UNIT IMPROVED AND REFINED—Heart of the efficient action of Cedarapids Horizontal Vibrating Screens is the refined vibrating drive mechanism. Timing gears run in oil to assure maximum life. Shafts have been improved through new and better manufacturing methods.

MOST EFFICIENT SPRINGS FOR LIVELY, SNAPPY ACTION—Cedarapids leaf springs assure sharp, vigorous action over the full length of the screen. There is no air cushioning to soften the "snap." Leaf springs are not affected by temperature, so no adjustments are necessary for temperature changes.



Cedarapids

Built by
IOWA

IOWA MANUFACTURING COMPANY • Cedar Rapids, Iowa

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ROCK PRODUCTS, November, 1961



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INDUSTRIAL AUTOMATION

ADDED VALUES

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Quality control influences every G-E operation, from order receipt to shipment.

PRODUCT INNOVATION

Product research and development is advanced in all 98 G-E laboratories.

APPLICATION ENGINEERING

Customer-oriented application engineers assist you with systems integration.

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The latest tools of process analysis are available for studies of your problems.

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G-E's systems experience focuses the full Company capabilities on your order.

NATION-WIDE SERVICE SHOPS

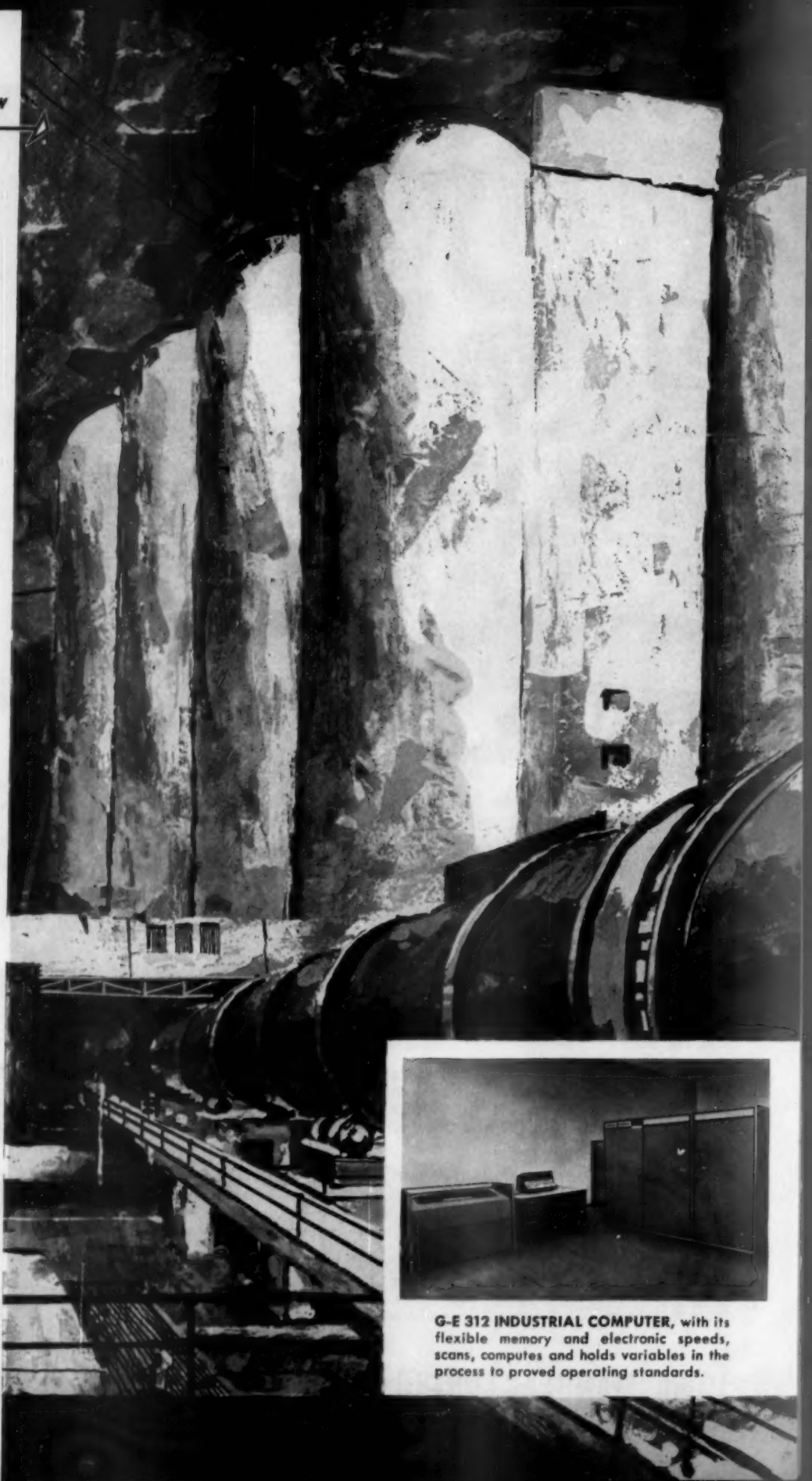
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Accurate delivery cycles put your new G-E equipment to work for you—on time.

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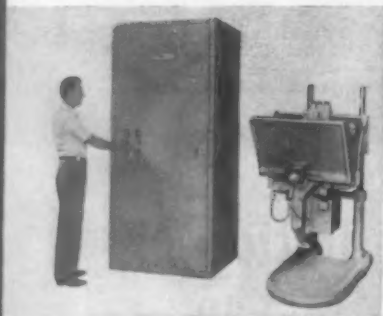
GENERAL ELECTRIC also offers you the system engineering experience and know-how so essential to such an important undertaking as plant automation. Throughout all phases of planning and installation, General Electric engineers work closely with your staff engineers to assure an automated system that will bring you the most desired results.

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G-E MOTOR CONTROL CENTER groups control for variety of small motors. Draw-out design simplifies installation and maintenance.



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The Euclid C-6 Crawler is your best tractor buy
for lowest operating costs...for work-ability...
and for reliability in heavy service.

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now even more work-ability!

With Torqmatic Drive and full-power shift, the "Euc" C-6 provides fast-as-a-fox maneuverability ... changes direction, from forward to reverse and back again with just a flick of the wrist. That kind of performance calls for fast blade action so the full work capacity of the C-6 can be utilized. Conventional tractor hydraulic systems didn't measure up ... in blade speed, low maintenance cost and freedom from excessive downtime resulting from wear and heat build-up.

Euclid and Gar Wood engineers combined their years of hydraulic experience with construction equipment and have developed a system that puts the C-6 even further ahead of other dozers in the same class. Incorporating a variable volume pump and single hydraulic cylinder, the C-6 with hydraulic blade provides important advantages in operation and maintenance ... advantages that are further proof of the C-6 being the lowest cost tractor in the 200 h.p. class, and most versatile by far!

COMPARE THESE FEATURES OF A "EUC" C-6 HYDRAULIC DOZER WITH YOUR PRESENT EQUIPMENT!

- ▲ **Fast blade speed—up or down...**
almost twice as fast as competitive units
- ▲ **More horsepower for tractive effort...** operator "meters" pump volume—no wasted engine power because no oil is pumped in "hold" position.
- ▲ **Better visibility...** blade corners not hidden by hydraulic cylinder or "A" frame
- ▲ **Greater lifting capacity...** improved mechanical advantage of single lever arm—blade mounting closer to center of front track roller
- ▲ **Less downtime...** only one cylinder—no high pressure on drive shaft seal—heat problem eliminated—pump works only when pressure is needed for raising or lowering blade



EUCLID

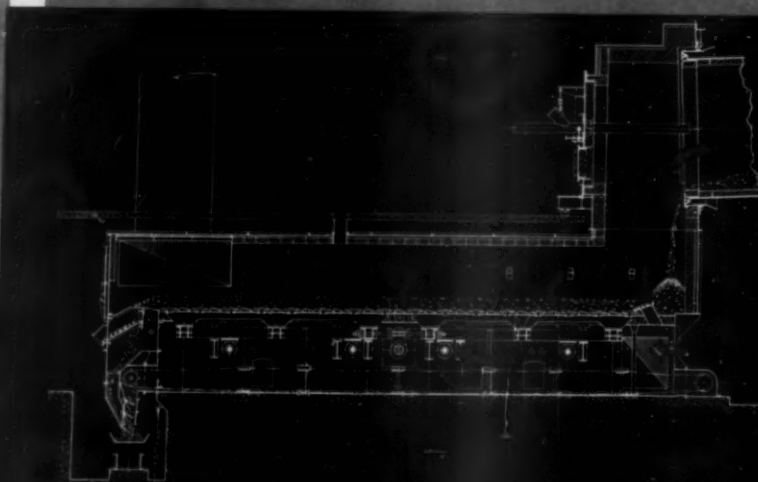
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CEMENT
CLINKER**



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WHAT'S HAPPENING

in other fields of interest to the rock products industry

Electricity may put explosives in the shade, when it comes to some types of secondary blasting and rock breaking. The Anaconda Co. has been sponsoring research by General Electric Co. in cooperation with Montana School of Mines, and they have come up with the amazingly simple, safe and economical process of electrothermal forcing. Electrodes are clamped to the rock, and high-energy radio frequency current then creates a channel for the following direct current. Result: thermal stress that cracks, splits or shatters the rock, according to the forces applied. No evacuation of personnel and only routine safety precautions are necessary. General Electric predicts that the new method will be 5 to 25 times cheaper than usual methods, and that the initial equipment should cost less than \$60,000. The firm also estimates that more than 300 U. S. underground mines could use such a process economically, in addition to open-pits, primary crushing setups, and in controlled rock facing.

A pipeline only 6 in. in diameter whizzes 1,000 tpd. of 1.5 percent copper concentrates from concentrator to railroad at the Chilean Atacama Desert mines of Anaconda Co. This downhill installation, using gravity all the way, saves the considerable expense of hauling dewatered concentrates down a rough terrain with numerous switchbacks.

Four huge vacuum cleaners are gulping sand from a Venezuelan ocean channel at the rate of 6,000 cu. yd. per hr., each one cutting a swath 6 ft. wide and 3 miles long. They are part of a remarkable ship—the Japanese-built Zulia, at 15,273 tons the largest ocean-going dredge in the world. Measuring 548 ft. long, the Zulia has a 437-ft. movable discharge boom amidship that can rotate 180 deg. Owner of the vessel is Seadredge Co., Inc., which has leased it to the Venezuelan government so that its Maracaibo port will be able to accommodate the 85,000-ton oil tankers of today.

By 1964, Japanese National Railways will be providing the fastest train service in the world. A story in Engineering News-Record (June 8, 1961, p. 45) reports that the 311-mile line linking Tokyo and Osaka will carry passenger trains at speeds up to 125 mph. and freights up to 90 mph. Costing \$548 million, the railway will be standard gage and electrically powered.

Those versatile belt conveyors are moving more people as well as rock products. Important markets for these "human handlers" are opening up in three areas: (a) multi-level shopping centers and stores that use shopping carts; (b) airports, railroad stations and other crowded public places (the Dallas airport is a notable example); (c) municipal redevelopment projects. Regarding the latter, Tacoma, Wash., has pioneered with a two-block-long, one mph. moving sidewalk. This system carries traffic through enclosed galleries among stores, banks and offices.

Please turn page

What's Happening

continued . . .

Chemicals can curb an 8 trillion gal. annual water loss being suffered by 17 drought-ridden western states. Measuring the loss at 25 million acre-feet, the U. S. Bureau of Reclamation is stepping up its spending and research on evaporation control. Harmless chemical compounds, such as a mixture of cetyl alcohol and stearyl alcohol, prevent water escape by their tightly packed molecules—which not only remain undisturbed by water sports but do not interfere with them. Early tests proved quite costly—at \$61 per acre-foot, the treatment cost more than the estimated water value. But by using wind distribution from rafts rather than planes or boats, as well as less expensive chemicals, scientists figure they can soon cut the expense to less than \$12 per acre-foot.

Smog meets its Waterloo in fine dolomitic lime particles. Dr. Leonard John Minnick, vice president-research, G. & W. H. Corson, Inc., has discovered that when disseminated as a fine dust or spray the lime prevents buildup of airborne waste products and removes those already formed.

The Soviets are out to set another record—this time with plans for a 990-ft. earthfill dam. Nourek Dam, which will include a 2.7 million kw. powerhouse and 2.5 miles of 35-ft. diam. tunnel, will be located on the Vakhsh River, southeast of the Caspian Sea. . . . At the same time, the Russians announced plans for a concrete arch dam of equal height. It will be located on the Ingouri River west of Stalingrad and may feature two new design concepts. The 9.5-mile tunnel will be 33 ft. in diam. and lined with 16 in. of concrete planned to permit a limited amount of cracking. And for added strength, the tunnel may have an oval cross section consisting of semicircles at the ends and rectangular inserts between them.

All kinds of liquid fuel, singly or in any combination, can be used by a new line of piston engines put out by GMC's Detroit Diesel Engine Div. Ranging from 20 to 650 hp., these engines require only simple tuning when switching fuels, rather than the extensive adjustments previously needed.

Corrosive, boiling, heavy, viscous—wet-process phosphoric acid has been very difficult for its producers to handle. It contains various solids and sulfuric and fluorine-containing acids, as well as gypsum and fluorosilicate salts (which precipitate out). So far, the best answer appears to be submerged combustion, a fairly reasonable process where natural gas is available. Here, the fuel is burned under the surface of the liquid and discharges combustion products directly into the solution. Construction materials for the plants presented problems until engineers settled on carbon and graphite to come in contact with the boiling acid, and efficient scrubbing systems are necessary to get rid of phosphoric acid fumes. Ozark-Mahoning Co., Tulsa, Okla., has been responsible for most of these installations.

An \$85-million gamble—the Enrico Fermi Atomic Power Plant at Monroe, Mich.—is still working on a dry run basis. The first large experimental breeder reactor (designed to produce more fissionable fuel than it burns), the Fermi plant is fighting for an Atomic Energy Commission operating license. Its opponents? Three AFL-CIO unions are striving to condemn it as a safety hazard. For more than a year, however, potential operators have been receiving thorough training on a simulator.



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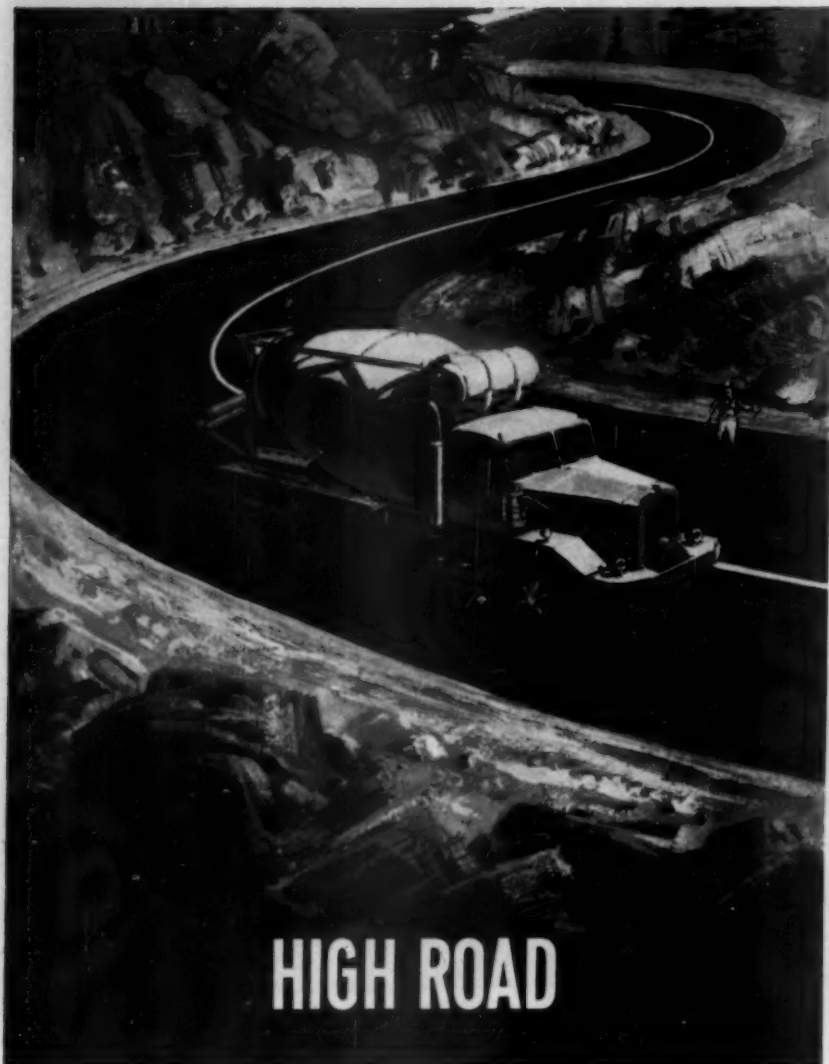
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ROCK PRODUCTS, November, 1961

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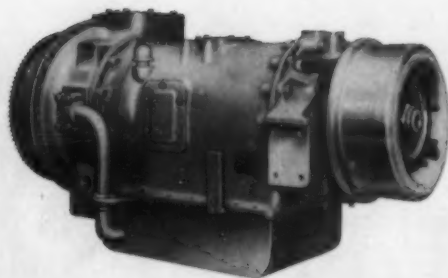
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EDITORIAL

by George C. Lindsay

There's danger in discord

THE DISPUTE between the National Crushed Stone Association and the National Limestone Institute, Inc.—over an industry stand on percentage depletion principles—is not in the better interests of the stone producing industry.

If carried further—and present indications are that it will be—the discord could mushroom into disaster. Closing of industry ranks is a solution.

Basis of the dispute is an offer of a “cut-off” point for the industry to the Internal Revenue Service. It was made, it is reported, at a September 20 meeting of representatives from NLI, National Lime Association and an independent producer with personnel of the Internal Revenue Service.

Since the meeting, NCSA has prepared and distributed to all crushed stone producers of record a 15-page report that enumerates its objections to the “offer” of a cut-off point based on, among other things, “the cut-off principle which appears to be involved” and “the exact language submitted to IRS and the Treasury.” In rebuttal, NLI prepared “a documented answer” to the NCSA report, and NCSA countered, etc.

Regardless of the merits of the positions taken by each faction in the conflict—and decisions based on them are extremely vital to the future welfare of the industry—the crushed stone industry is openly divided. It is the real victim. The industry itself must in final analysis bear the burden of danger in discord, not only on the important question involved but on all future industry questions of a national nature.

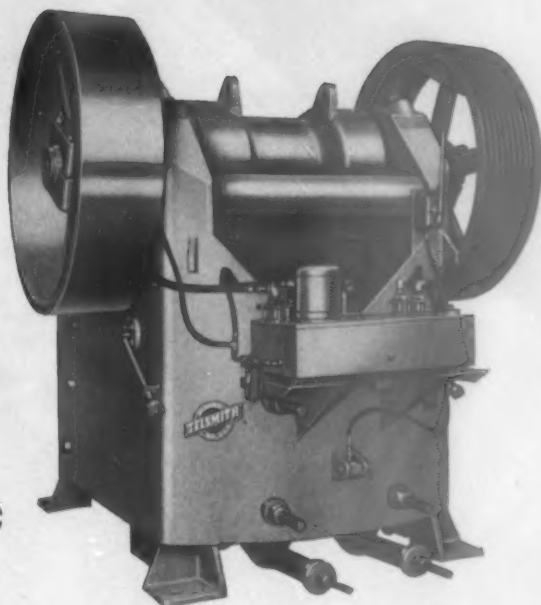
However, merits of the positions taken by both sides have to be considered seriously by all industry producers to factually determine what actually best serves the industry. It's an important decision.

As publishers, we have a vital interest in the future welfare of the industry encompassing all kinds of crushed stone. Also, we have the highest respect for and interest in the national associations, and share joint responsibilities with them in serving industry producers. In this and other similar cases, our position must be with a united industry—united on basic principles that would serve its own best interests.

In the better interests of the crushed stone industry en toto, this is no time for sustained passion among individuals or groups, which would result only in the widening of a most unfortunate breach already created.

Rather, now is the time for a high-level cooperative conference to mend fences. We believe a “summit” meeting among all affected producers of crushed stone can result in a united industry, which must exist if proper progress is to be attained.

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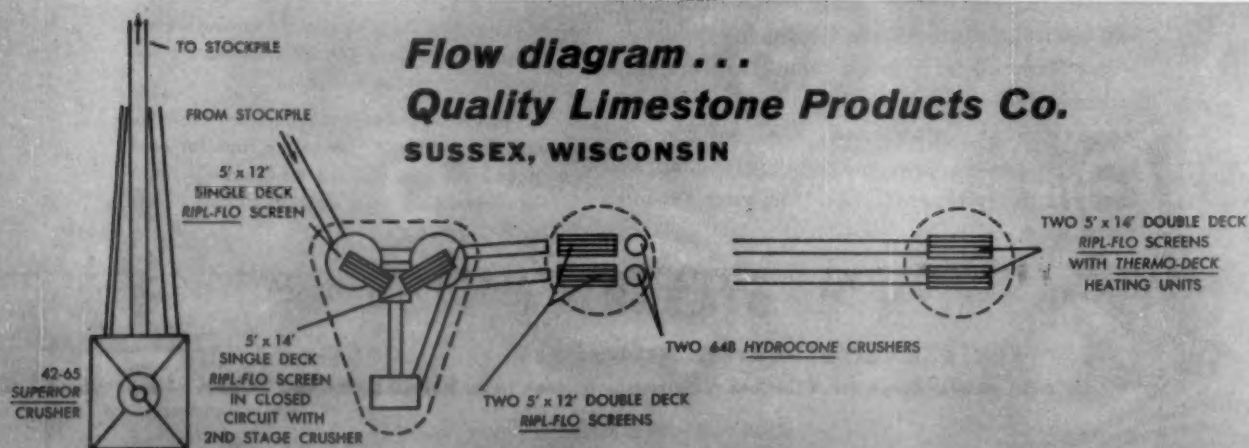
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"It sure chews up the rock." That's how Mr. Lloyd Wolf — president of Quality Limestone Products Company, Sussex, Wisconsin — describes his new 600 tph *Superior 42-65* gyratory crusher. The excellent performance of this rugged, dependable unit is no surprise to Mr. Wolf. He says, "We've used A-C crushers ever since we started in business—they've certainly helped us keep costs in line."

One of Quality's first crushers was a 48" *Hydrocone* crusher. It is still in use today, along with a newer 648 *Hydrocone* machine, for tertiary crushing. Both crushers are equipped with *Hydroset* control — an exclusive A-C feature that regulates product size instantaneously and automatically releases tramp iron.

"Allis-Chalmers," Mr. Wolf relates, "helped us right from the start. They showed us how to set up an efficient plant, and haven't stopped helping us since." One A-C recommendation was the addition of a surge pile after the primary crusher. This enables Quality to utilize machinery and manpower more efficiently.

Mr. Wolf's plant is also equipped with A-C vibrating screens. He is pleased with their dependability and rugged construction.

The success story of Quality Limestone Products Company is typical among A-C customers. Perhaps we can help *you* achieve better profit and growth, too. Call in your A-C representative. Or write **Allis-Chalmers**, Milwaukee 1, Wisconsin.

A-1541

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helped us grow!"



Overall view of quarry, showing surge pile at extreme right.



SUPERIOR primary crusher handles up to 600 tph of dolomitic limestone.



RIPL-FLO screens in closed circuit with second stage crusher.



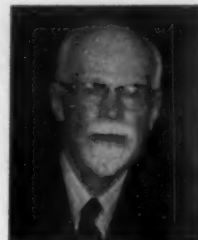
HYDROCONE tertiary crushers with 2-deck RIPL-FLO screens.

ALLIS-CHALMERS



ROCKY'S NOTES

by Nathan C. Rockwood



Japanese research on portland cement problems

AS IN THE PREVIOUS ANNUAL PROCEEDINGS that we have commented on in these columns, we find in the 1959 "Review of the Thirteenth General Meeting of the Japan Cement Engineering Association," abstracts—or conclusions—of 73 papers contributed by several times that number of chemists, engineers and college professors on some of the practical problems encountered in the manufacture and use of portland cements. These are presented in a 106-page book in readable English and contain a great deal of interesting and suggestive material. We have only one criticism of the editor's English; he does divide words that run over a line, just wherever the typographical break comes, regardless of the syllables, so that some parts of words look odd to the American reader.

We will confine our comments here to those papers which bear on the manufacture and characteristics of cement, and reserve our comments on other subjects for a later issue. There are 17 or 18 papers in this (our) classification, and we have space only to touch on a few high points that interest us. However, we feel certain there are just as many points omitted that are of equal interest to others. In the past, we have found that the Association has been quite willing to supply interested American readers of these Notes with copies of the Reports for the asking, although we presume the supply is rather limited. The address of the Japan Cement Engineering Association is No. 1 Akasaka Daimachi, Minato-ku, Tokyo, Japan.

One of the perennial problems in the cement manufacture is the effect of MgO in the raw material and in the resulting clinker. This has become more important since the development of portland-blast-furnace slag cements, because some 20 percent addition of blast furnace slag often contains much more MgO (by chemical analysis) than is ordinarily allowed in portland cement. However, it seems to be established that excessive

MgO in cement is harmful only when it is in the form of hard-burned oxide or periclase. In slags, the magnesia (MgO) is combined and is harmless up to at least 24 percent, according to F. M. Lea ("Chemistry of Cement and Concrete"), although American specifications do not allow so much. A problem then is: Does magnesia ever combine with other portland cement components other than slag so as to be harmless? An answer is contained in a paper by Akihisa Kato on "The Possibility of the Entry of SiO₂ into the Clinker Ferrite Phase to Form a Solid Solution."

His conclusions were: "(1) From X-ray examination of annealed samples having a composition of C.A.F + SiO₂, it can be seen that SiO₂ enters into the ferrite phase to a small extent, and its crystal lattice expands considerably as compared with those of the original ferrites. The mechanism of the solubility of this solid might be explained either through defect of lattice or by (Al · Fe).O₂ → SiO₂ + FeO substitution. (2) The system 4 CaO · Al₂O₃ + MgO · Fe₂O₃ and 2 CaO · (Fe₂O₃ · SiO₂ + MgO) was examined, and it was found that the substitution of melilite type (Al·Fe).O₂ → SiO₂ + MgO, may occur in the crystal structure of the ferrite phase; SiO₂ + MgO seems to substitute for (Al·Fe).O₂ to the extent of about 10 mol. percent. The solubility of SiO₂ and MgO in the ferrite phase is therefore estimated as about 2½ percent SiO₂, and MgO about 1½ percent, by weight."

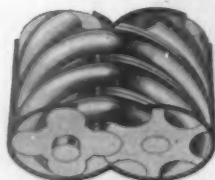
We interpret this to mean that at least a small percentage of excess MgO can be accommodated if SiO₂ is provided to aid its absorption, or solution. Apparently, in ordinary portland cement clinker the excess of CaO or the limited amount of SiO₂ makes it impossible for MgO to react with any of the other ingredients in the clinker. It is generally believed, of course, that the MgO - SiO₂ silicates have little or no hydraulic cementing properties, but perhaps this possibility has been

Please turn to page 114



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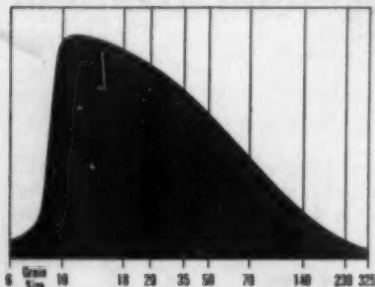
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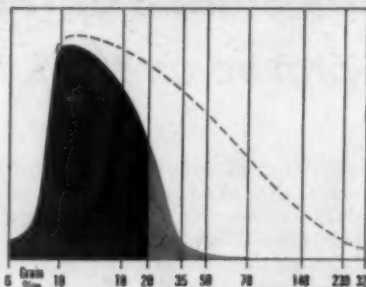
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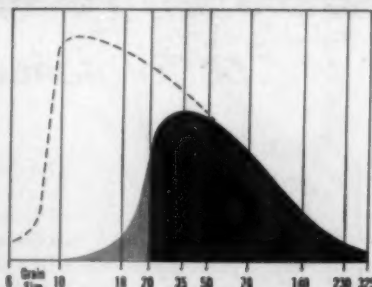
**Rheax System Classification and Dewatering Plants
Binder System Vibratory Screens and Conveyors**



A. This typical natural raw sand was fed to a Rheax plant for continuous separation at Mesh 20.



B. Composition of the minus Mesh 20 and the plus Mesh 20 fractions achieves near perfection as shown by the black sections above. These curves represent an actual case history of Rheax performance.



WASHINGTON LETTER

by Edgar Poe

Railroads Favor census On traffic

The U. S. is the most mobile country in the world. The transportation systems represent a \$100 billion business or approximately 20 percent of the gross national product. For instance, the trucking industry is second only to agriculture as an employer of people, but the trucking industry is still an unknown industry to most people.

Thirteen years ago Congress authorized for the first time a census of transportation. However, Congress never got around to appropriating the money to conduct it. Now there appears to be sentiment in Congress for taking such a census, based on three specific things: a survey of passenger travel; a survey of trucks and bus transportation, and a survey of shipment of manufactured products. Nevertheless, the final determination on whether there will, or will not be, an enumeration in 1963 remains up in the air for the present.

The railroads, a sick industry for some carriers, want the census, but a large segment of the trucking industry is skeptical. Frank L. Barton, deputy undersecretary for transportation, Department of Commerce, believes many benefits would accrue to industry and government by conducting a transportation census, including an improved basis for forecasting traffic volumes and requirements for public and private transportation capacity. There would be a mobilization of the nation's transportation capacity immediately in the event a shooting war would break out.

Concrete Gains in Importance

A study by the Department of Labor shows that the costs of materials used in the construction of public schools amount to \$555 for each \$1,000 of construction contract. At the current rate of construction, industries making and distributing construction materials receive about \$1.4 billion a year from money spent on public schools.

Among the major materials used, the general grouping "metal products" accounted for \$161 for each \$1,000 of school construction contract. Within this group, about one-third of the value was

comprised of structural and reinforcing steel. Fabricated sheet-metal products and metal windows and doors were other important items.

Stone, clay and glass products accounted for \$138 of each \$1,000 of contract. More than half of this was spent on cement, concrete and concrete products. In recent years, ready-mix concrete has become a major item (approaching 4 percent of total contract). Its growing importance, along with other concrete products, has been reflected in reduced use of brick and other clay products, which accounted for only \$23.

Clay, shale Depletion Tax approval

Congress has corrected an injustice in passage of a bill clarifying the tax treatment of certain clays and shale. The measure does not change any depletion rates or affect the base for percentage depletion in the future. It was designed to stop what sponsors called "gross inequity" on the part of the Internal Revenue Service seeking to collect taxes retroactively as the outgrowth of a 1960 decision of the U. S. Supreme Court (*U. S. versus Cannelton Sewer Pipe Co.*) which made the raw material the base for depletion allowances.

The House Ways & Means Committee, where the tax clarification measure originated, reported that there had been a long line of court cases upholding percentage depletion on the finished product prior to the tribunal's 1960 decision, and that the Internal Revenue had settled many cases on this basis.

After the Cannelton decision, in which the nation's highest court ruled that fire clay was marketable in a raw state and, thus, subject to depletion allowance at that stage, the Internal Revenue people declared they would follow the principles of the Cannelton case in disposing of earlier cases. The Ways & Means Committee still maintained that the IRS policy appeared to be "highly inequitable."

The Treasury Department advised Congress that refunds pending for 1951-57 were approximately \$17 million and revenue losses for 1957-60 would amount to from \$22 million to \$24 million.

Please turn page

Washington Letter

continued . . .

Labor Board Policy Change

The National Labor Relations Board has delegated to its 28 regional directors broad decision-making powers and duties in processing employee representation election cases. These powers have previously been exercised only by the five-member board in Washington. The change is expected to speed decisions. The delegation of decision making and other powers by the board to its regional directors is one of the most far-reaching steps the board has ever taken with respect to its election cases. N.R.L.B. has been faced with a steady increase of labor practice cases in recent years, thus slowing down decisional processes of the board.

Bridge increase Proposal pending

A bill pending in Congress setting specific vertical clearance heights in the Upper Mississippi River would involve additional costs of some \$23 million, Federal Highway Administrator Rex Whitton testified before a Senate Public Works Subcommittee. The House-approved measure would require that vertical clearance on any bridge constructed across the Mississippi between the Illinois River and St. Paul, Minn., be not less than 55 ft. above river levels reached 98 percent of the time, and not less than 63.7 ft. above river levels at normal navigation pool stages. Clearances for bridges spanning navigable streams by tradition are determined by the Army Engineers.

Cement Suit is Settled

The Department of Justice reports that it has settled an anti-trust suit against a Memphis, Tenn., trade association and light building material dealers charged with fixing cement prices. A consent judgment terminating the suit was entered in federal court at Memphis.

Urban affairs Department is Advocated

President John F. Kennedy reiterates that he favors creation of an agency designed to coordinate expanded federal activities encompassing housing, transportation, urban development and planning and pollution control. An agency or department handling urban affairs probably would become one of the federal government's biggest construction agencies. Such a department would have certain authority in connection with housing, urban redevelopment, highways and sewage.

President Kennedy has made it absolutely clear that he favors completion of the accelerated national highway program on schedule. He is expected to recommend to Congress that the road construction program be stepped up.

The chief executive is also on record favoring federal grants to states to be devoted to classroom construction and for teachers' salaries. This proposal, however, will run into a sharp scrap.

Bureau Issues "Earth Manual"

The Bureau of Reclamation has published a new edition to its Earth Manual successor to the 1951 edition. The manual was penned by Bureau specialists in the field of soil mechanics. It provides current technical information relating to field and laboratory investigations of soils used as foundations and materials for dams, canals and other types of structures.

Earth Manual's preface explains that sections are devoted to problems of rolled earth dams, canals and miscellaneous construction features. Each section presents research and information on design features and usual specifications provisions to aid control personnel with a background to assist in implementing the recommended control techniques.

Seven Federal Agencies pool Air resources

Capabilities of seven federal agencies are being pooled to carry out the government's new \$394 million program to aid areas suffering from substantial and persistent unemployment and underemployment. The agencies, in addition to the Area Redevelopment Administration headed by William L. Batt, Jr., are the departments of Agriculture, Interior, Labor, and Health, Education and Welfare, the Small Business Administration, and the Housing & Home Finance Agency.

Roles which the various agencies will play are spelled out by the Secretary in a memorandum delegating authority under the Area Redevelopment Act.

Over-all supervision and coordination of the new government program will remain the responsibility of ARA. The Area Redevelopment Administration will have representatives in the states, working closely with state development agencies to assist communities in making the best possible use of the facilities offered by the participating agencies. Three of the agencies involved—Labor, HEW and HHFA—have specific statutory authority for phases of the depressed areas program.



The tractor is an International Model R-195, powered by an RD-450 engine. Power is transmitted through a Fuller 5-speed Model 5-A-620, featuring overdrive in 5th gear, and an Eaton 2-speed drive axle.

18 tons . . . 100,000 miles a year

"Our tractors average over 100,000 miles per year, consistently hauling 16 to 18-ton loads, and we get excellent performance from our Fuller Transmissions," states Allan E. Mc-

Garity, Officer of the Harmony Blue Company, Inc. of Elberton, Georgia. "We feel that the reliability of the Fuller Transmissions has been a major factor in the excellent perform-

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ROCK PRODUCTS, November, 1961

27

LABOR RELATIONS

A roundup of actual day-to-day in-plant problems and how they were handled by management men

How would you decide?



Can management use a written test to determine ability for a job?

What Happened: The company had an opening in the department. Mike Albert bid for the job along with 11 other men who had more seniority than he. The company had a standing practice of using tests to aid in determining the best qualified employee when promotions were made.

The 12 men took the written test. The questions were based on the duties spelled out in the description of the job classification. Mike got the promotion.

Tom White was one of the men bidding for the job. He had 10 years of experience and felt that his seniority and work experience entitled him to the job. He asked the union to support his claim.

The agreement said that "In all cases of promotion where employees can satisfactorily perform the job requirements, seniority will be the determining factor." But when the senior employee "cannot satisfactorily perform the job requirements, ability shall prevail over seniority." The union argued:

1. Much of the promoted job involved work in which Tom had 10 years of experience.

2. The written test was "academic," and work on the job requires practical experience.

3. The company didn't show the test to the union before giving it to the employees.

The company's reply was this:

1. The job requires more skills than Tom has—and Mike Albert is competent in them all. Tom White isn't.

2. The written test is fair. It was used in the past; it tests the skills needed on the job, and it was given in a manner fair to all 12 men.

3. The company doesn't have to show this test or any test to the union.

4. Tom White failed the test.

Was the company:

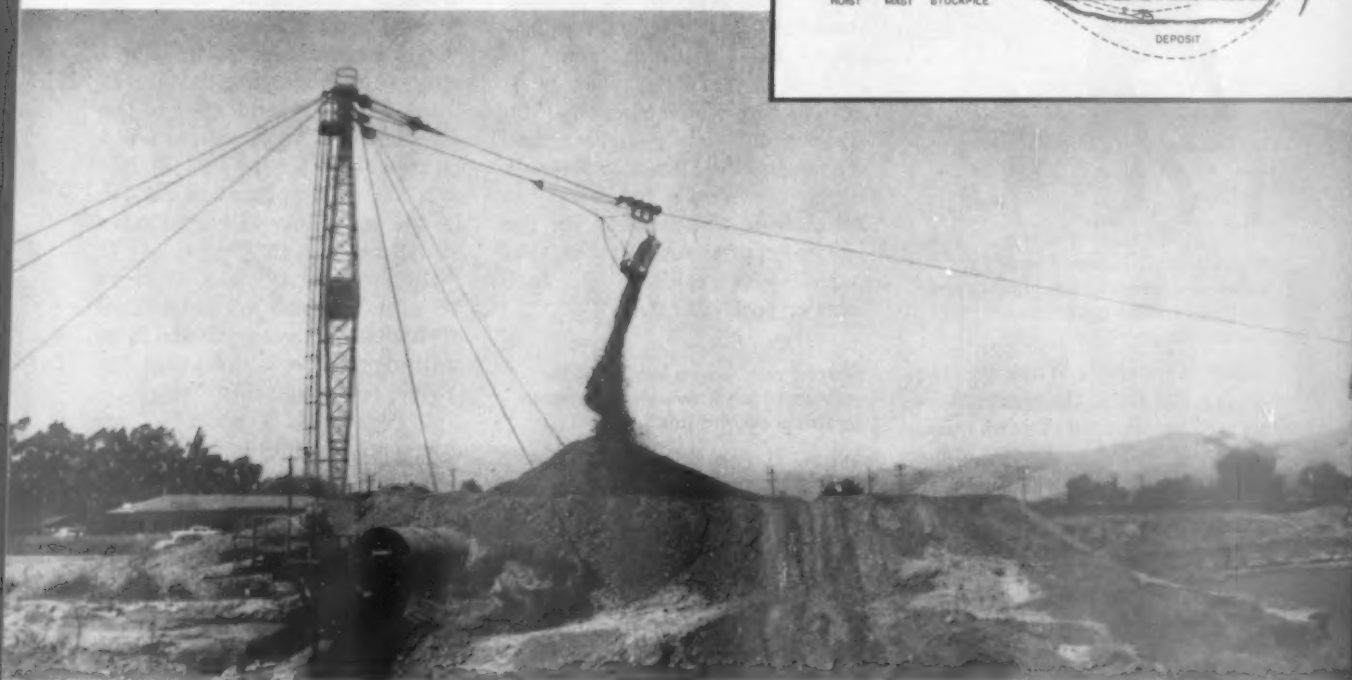
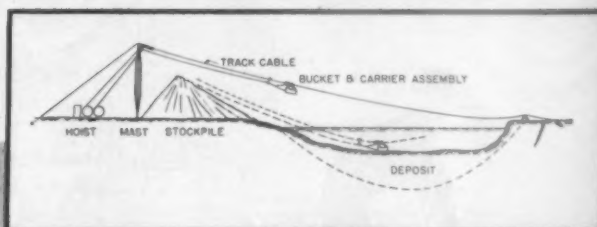
Right? ☐ Wrong? ☐

What Arbitrator Shister ruled: "The test was fair and proper. The questions were based on the job duties. Granted that all the other employees took the identical test, the company did not discriminate against Tom White. The company is not obligated to submit a test to the union before administering it. The argument that a man should not be judged on the basis of an 'academic' test is unpersuasive. The use of such 'academic' tests is one of longstanding in the bargaining unit. The fact of Tom White's experience is also unpersuasive. For while it is true that the job calls for his kind of experience, it also calls for other abilities. The job necessitates a competence in all the relevant job duties—not only in some of them. The company's choice of Albert was fair. Tom White's grievance is denied."

Please turn to page 30

GET ALL THE MATERIAL OUT OF YOUR PIT

**A Sauerman Slackline Will
Recover It For 6 Cents A Ton**



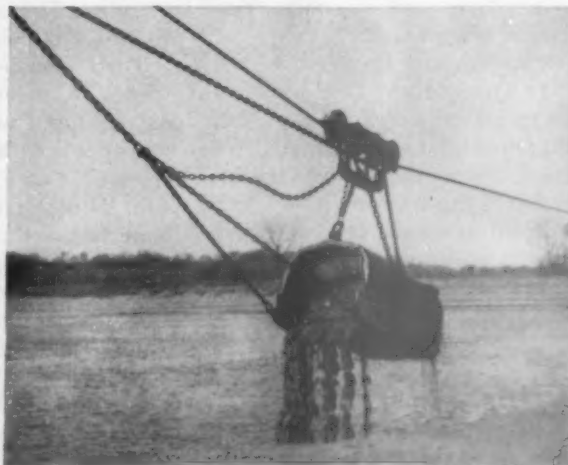
Plants Like This Are Turning Hard-To-Reach And Deep Materials Into Increased Profits

One way to beat increasing land values and depleting resources is to get all the material out of your present deposit. You can do this with a Sauerman Slackline Cableway. The machine starts at ground level and continues to work at depths and distances that cannot be reached with other excavating equipment. A Slackline will dig 100 feet below water and haul loads over 1000-ft. spans.

A Sauerman Slackline beats rising operating and labor costs, too. It provides what is probably the most economical of all excavating and hauling methods. Operating costs as low as 6 cents per ton for labor, power and maintenance are frequently reported.

Another advantage of the Sauerman Slackline is that it can be operated continuously in all types of weather. This permits building a ready stockpile to meet seasonal or unforeseen demands.

If you are starting a new plant or updating an existing one, do it with the machine that gets the most out of your deposit at lowest possible cost. Sauerman Slacklines are built in sizes up to 3½ yds. to match your tonnage requirements. Write or call about your deposit. We'll recommend the proper machine.



Bucket inhauling load from 100-ft. depth.

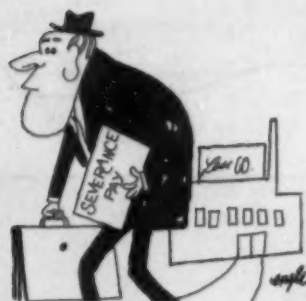
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Labor Relations

continued from page 28



If you lay off some of your salesmen because business is poor, do you have to give them severance pay?

What Happened: When business took a bad turn, the company began to cut payroll. Ten salesmen were given their notices. They demanded severance pay—one week for every six months of service. The company was surprised. While the salesmen were covered by a union agreement, there was nothing in the contract that called for such provision. Argued the union:

1. True—there is nothing in the agreement about severance pay. But there is a clause which says that there shall be no lowering of working conditions for the life of the contract.

2. It has been the policy of the company to give severance pay to employees and salesmen. You cannot change that.

The company answered:

1. That's right. We have always given severance pay. But that was at our discretion. We did it when business was better. Now we can't afford it.

2. If severance pay was such a solid policy as the union says, then why wasn't it included in the bargaining agreement?

Was the company:

Right? ☐ Wrong? ☐

What Arbitrator Turkis ruled: "Severance pay is a major condition of employment—and no parallel of the 'Xmas Turkey' situation. The practice was initi-

ated and perpetuated on a bi-lateral, rather than a unilateral, basis. The practice is of long standing and maturity. Employees have assuredly come to rely on the practice. The business factors which compelled the layoff manifestly require a severance payment basis or formula which provides a fair and just solution of the problem. In the judgment of the Arbitrator, that basis is one week's pay for each year or portion thereof."

Should you keep a worker who refuses to work overtime because he has a second job?

What Happened: For about 3 years business was pretty good so the company was able to offer Joe Hernandez and other employees about 6 hr. overtime a week. But when business slackened off, Joe went on a regular 40-hr. stint. There was really not enough work to keep him busy, but the company found odd jobs for him so that he could fill out the full 40 hr.

To make up his "lost income," Joe got himself a second job. As a result, his work suffered. He began to leave 5 or 10 min. early and often came in late in the morning. His supervisor talked to him, and habits improved.

Then business took a big upturn. To meet schedules, the company put all production employees on a 48-hr. week, thus giving each man 8 hr. overtime. Joe said he couldn't accept the overtime because it would interfere with his second job. The company wrote him a letter advising him that he would have to work the full schedule of 48 hr., or be dismissed—so that the company could replace him with somebody who could work the necessary overtime.

When Joe still refused to agree to work the required overtime, he was fired. His case went to ar-

bitration. He argued his case:

1. The regular workweek is 40 hr. Any extra hours should be voluntary by the employee.

2. I have a big family and I must supplement my income. If I give up my second job and the overtime is cut out, where will I be then?

3. I'll give up my second job if the company will guarantee me 48 hr. a week.

4. The company has no right to interfere with my outside activities. I do a good job and have nothing against my record.

The company said:

1. We have a right to ask workers to put in reasonable overtime. Otherwise we couldn't meet our schedules.

2. We can't offer a guarantee of a 48-hr. week to anyone. Business is not that certain.

3. We should have first crack at a man's time. His first loyalty is to his regular job.

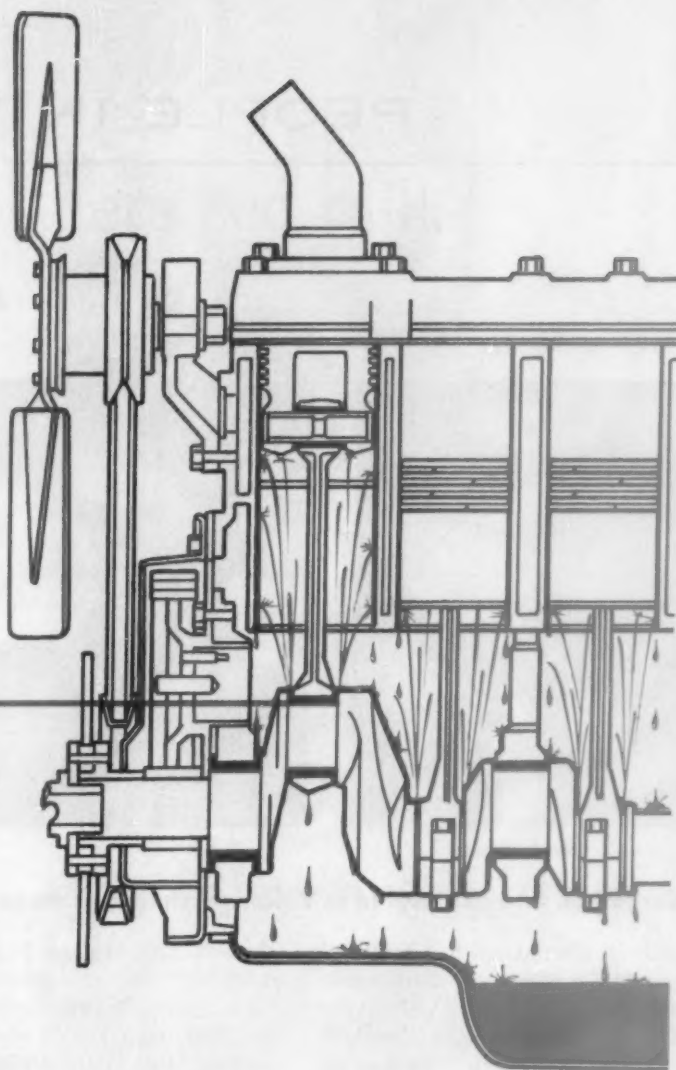
Was the company:

Right? ☐ Wrong? ☐

What Arbitrator Stutz ruled: "The basic question to be decided in this case is whether an employee may refuse to work a regular schedule of overtime because he has taken a second job, the hours of which conflict with the overtime scheduled in his primary employment. The answer to this question must be 'no'. While the Arbitrator is sympathetic with the economic problems faced by a man with a large family, it cannot accept as reasonable Hernandez' refusal to work overtime because he had a second job. The employee was not being asked to work hours not required of other employees. He was simply being asked to meet a schedule of work hours that all other employees in the bargaining unit were asked to work. Hernandez was discharged for just cause."

END

Why precision bearings are vital here



Engine bearings have *two* vital jobs. They provide a low-friction surface for journals to ride on. But equally important, they control the oil throw-off, due to the spinning action of the shaft, that lubricates and cools cylinder walls and other engine parts.

Exact tolerances are needed in engine bearings and shaft diameters to get the kind of precise "clearances" needed to control oil throw-off. *Too little clearance*—an error of less than .001"—may result in an overheated bearing and early bearing failure due to insufficient lubrication.

Too much oil clearance is equally harmful to proper engine performance. If oil clearance is changed from

just .0015" to .006", the oil throw-off (shown above) increases 25 times. And even the best piston rings can control only about a 5 times normal amount of oil. The excess oil then slips past piston rings into the combustion chamber where it clogs piston rings and builds up combustion chamber deposits.

Federal-Mogul knows, as you probably do, the importance of oil clearances. That's why **Fm** bearings are manufactured to tolerances as close as $\pm .000125"$ —1/16 the thickness of a human hair. Why take a chance on anything less than precision engine bearings? You can be sure of a satisfied customer when you use the best. See your Federal-Mogul jobber.



FEDERAL-MOGUL ENGINE BEARINGS

FEDERAL-MOGUL SERVICE

DIVISION OF FEDERAL-MOGUL-BOWER BEARINGS, INC. • DETROIT 13, MICHIGAN

PEOPLE IN THE NEWS



Leo L. Warren



J. H. Carnathan

Carnathan succeeds Warren as Vulcan purchasing manager

J. H. Carnathan has been appointed manager of purchasing services for Vulcan Materials Co., Birmingham, Ala., succeeding Leo L. Warren, who has retired after 36 years of service.

Mr. Carnathan, a native of Mississippi, has been with Vulcan and its predecessor, Birmingham Slag Co., for the past 21 years. Most recently he has been special assistant to the vice president of operations. Mr. Carnathan has served Birmingham Slag as assistant superintendent and chief electrician, and became assistant manager of equipment in 1958. He has also served as director of maintenance of the Consumers Div. (Chicago) and also as assistant to the vice president of operations and general manager of the Concrete Products Div. of Consumers.

Mr. Warren is a native of Tennessee and joined Birmingham Slag in 1925 as chief electrician.

He was later promoted to superintendent of maintenance and then general superintendent. He has been manager of equipment service for Vulcan Materials since 1957.

Universal Atlas Cement appoints superintendent

Clifton L. Schandelmayer has been appointed superintendent of the Port Everglades, Fla., cement storage and distributing station of the Universal Atlas Cement Div., U. S. Steel Corp., which was recently acquired from Ponce Products, Inc. Hardy Magrath has been named manager of the new sales office at Port Everglades.

Mr. Schandelmayer, a native of Marlborough, Mass., attended Northeastern University, Worcester, Mass., Wentworth College, Boston, Mass., and Massachusetts Institute of Technolo-

gy, majoring in electrical engineering. He was vice president of operations, Ponce Products, Inc., at the time it was acquired by Universal Atlas.

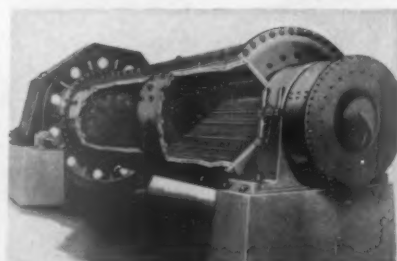
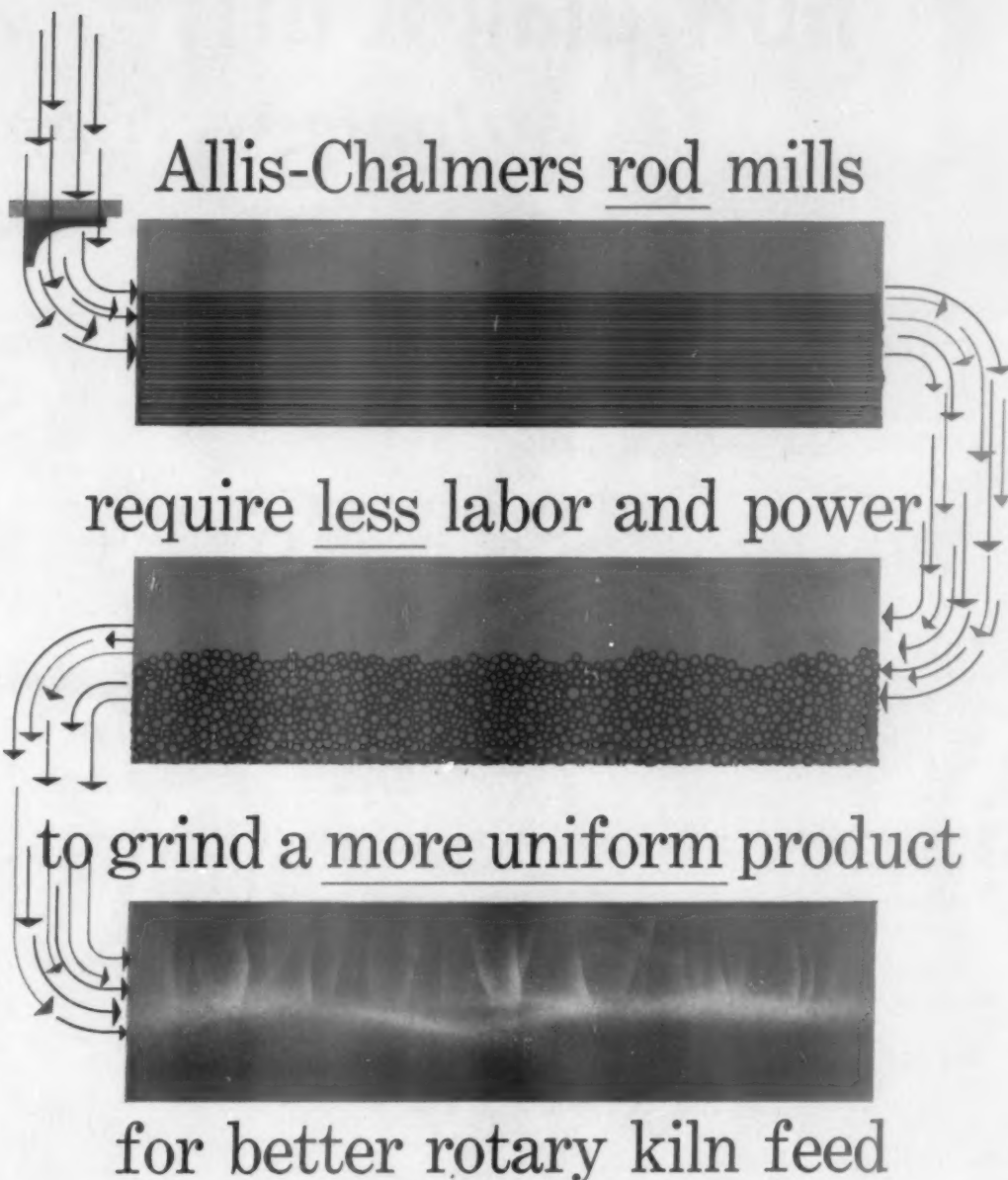
Mr. Magrath, a graduate of the University of Michigan, was formerly executive secretary of the Concrete Research Institute of South Florida, Inc. He has had 37 years of experience in cement sales.

Alpha manager elected PCA Club vice president



William E. Ellis, manager of the Birmingham, Ala., plant of Alpha Portland Cement Co., has been elected vice president of the Portland Cement Association's "Thousand Day Club" in recognition of his plant's outstanding safety record. The Birmingham plant established a safety record of 3,000 days without a lost-time accident, the longest current record of the Association.

Please turn to page 36



The modern approach for preparing wet kiln feed in open circuit. The first compartment contains rods to closely size the material for following ball compartment.

Allis-Chalmers engineers and builds rod mills, *Ballpeb* compartment-type ball mills, and *Rodpeb* combination rod-and-ball mills. Write to Allis-Chalmers, Industrial Equipment Division, Milwaukee 1, Wisconsin.

Ballpeb and *Rodpeb* are Allis-Chalmers trademarks.

A-1554

ALLIS-CHALMERS

Enter 1035 on Reader Card

How planet-drive "25" *stripping...ripping.*

To make full-load turns, you simply change the speed of either TD-25 track with "live-track" Planet Power-steering. This way, you keep full power and traction on both tracks, *full time*. You get rid of load-limiting, profit-squeezing "dead-track drag."

To handle big offset loads, or to counteract the side draft of benching or highwalling, without sluing or bank-nosing, is finger-tip easy. Just shift the TD-25's load-side track to high range; leave the other track in low. You stay on course, deliver full loads or make full cuts under full power.

To keep full loads on the move, full time through tough or easy going, use instant-acting, on-the-go Hi-Lo power-shifting. Pit-to-hopper matching of power to condition helps "keep the heap"—extends effective dozing distances—cuts down on payload spillage. Fast, easy TD-25 power-shifting is a built-in bonus of Planet Power-steering!

And only the International TD-25 gives you the 230 hp wallop of the free-breathing, dual-

Doubling for dynamite—this TD-25 rips and breaks up a 30-inch vein of coal—to reduce cost of loading out with a 3-cu yd power shovel for Rice Brothers Coal Company, Phillipsburg, Pa. Power-on-both-tracks steering means "full speed ahead" with the ripper. The two TD-25's on this job team up with three draglines to move 25% of a 60-foot-deep overburden.

valved DT-817 diesel—with peak turbocharging efficiency at all altitudes.

Prove the profit advantage of full-load delivery, full time. See how consistently the TD-25 outproduces king-sized clutch-steered competitive rigs. Compare operating and upkeep economy, too. Let your International Construction Equipment Distributor demonstrate.



**International
Construction
Equipment**

International Harvester Co.,
180 North Michigan Ave., Chicago 1, Ill.
A COMPLETE POWER PACKAGE

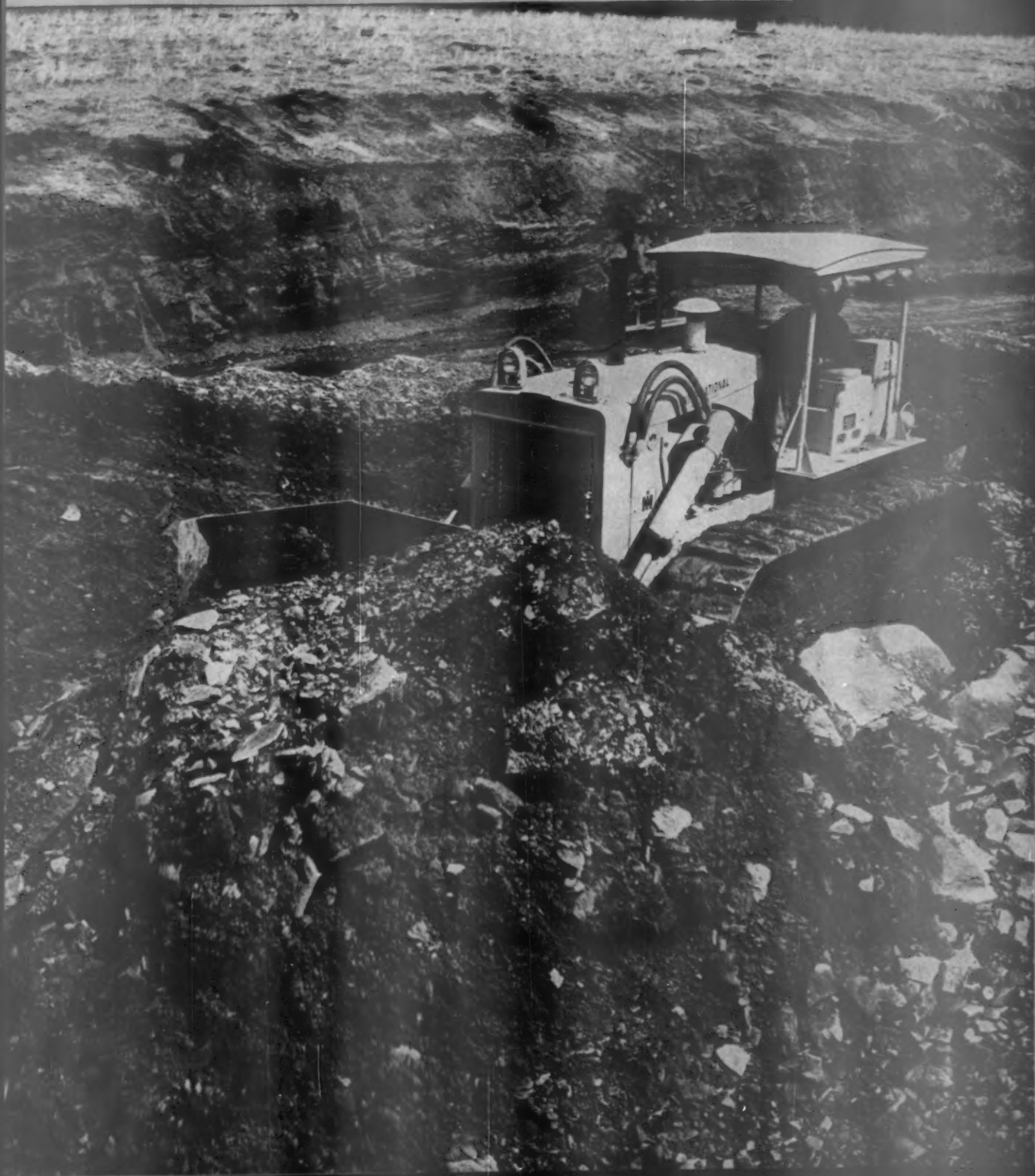
"Our International TD-25 doubles load delivery of regular 'dozer blade...using V-type blade on spoil leveling," reports Partner Carl Sartori, Willowbrook Mining Co., Slippery Rock, Pa. On-course steering with this heavy offset load is achieved by up-shifting speed of load-side track—to put extra power leverage where needed.

Pushes of over 600 feet pay off for Contractor C. R. Davis, Albuquerque, New Mexico—producing road gravel. Instant speed control of either or both tracks with the planetary transmission means positive load control—to heap the blade and "run" to the crusher. Then the "25's" high reverse of 7.5 mph means fast back-up for the next push. What would have been a costly two-tractor operation is efficiently done with one TD-25!



JUMPS CAPACITY

.. highballing loads!



People in the News

continued from page 32



Medusa elects Bernard senior vice president

David G. Bernard has been elected senior vice president of Medusa Portland Cement Co., Cleveland, Ohio. Mr. Bernard, who has just joined Medusa, was formerly general manager-sales of the Canco Division of American Can Co. Born in Boston, he was graduated from Harvard College and received his Masters degree from Harvard Business School.

Jensen, Shanks, Dersnah and Patzias promoted by Dundee

Ib Jensen, formerly process engineer, has been promoted to plant superintendent of Dundee Cement Co., Dundee, Mich. A graduate of Polyteknisk Loeranstalt, Copenhagen, Denmark, with an MS degree in chemical engineering, Mr. Jensen was formerly associated with F. L. Smidth & Co. in Europe and the United States.

Douglas C. Shanks, who joined Dundee in 1959, has been appointed superintendent of services in addition to his duties as purchasing agent. He is a native of Toledo, Ohio.

William R. Dersnah has been advanced to technical superin-

tendent. He joined Dundee in 1958 after being associated with other cement companies as chief chemist and manufacturing process engineer. He is a native of Milwaukee, Wis., and received his bachelor's degree from Central Michigan University at Mt. Pleasant and his master's from the University of Michigan.

Terry Patzias has been appointed chief chemist. He joined Dundee in 1959 after five years as plant chemist of the General Cement Co. of Greece and a short period in production research for Wyandotte Chemical Co. A native of Trikala, Greece, he received his BS degree from the National Technical University of Athens and his MS in chemical engineering from Wayne State University.

Universal Atlas sales appointments

Fred L. Wagner has been appointed vice president-customer relations, Universal Atlas Cement Division of U. S. Steel Corp. He was formerly manager of sales-eastern region and will be succeeded in this position by James E. Taylor, who has been serving as assistant to vice president-general sales.

ASTM presents Awards of Merit

Percy L. Rogers, vice president, research, Riverton Lime & Stone Co., Riverton, Va., was recently presented the Award of Merit by the American Society for Testing Materials, in recognition of many years of constructive support and leadership in the work of Committees C-7 on Lime and C-12 on Mortars for Unit Masonry.

William Lerch, consultant on cement and concrete, and retired administrative assistant of the research and development divi-

sion, Portland Cement Association, Chicago, Ill., was presented the Award of Merit in recognition of his outstanding service and contributions to ASTM research and standards work, especially Committee C-9 on Concrete and Concrete Aggregates.

Warner elects J. N. Kemple executive vice president

Joseph N. Kemple has been elected executive vice president of marketing and operations, Warner Co., Philadelphia, Pa. He has also been elected to the board of directors and to the executive committee. A graduate in industrial engineering from Stanford University, Mr. Kemple was formerly general manager of Page Steel & Wire Div., American Chain & Cable Co.

OBITUARIES

John W. Smith, retired superintendent of the Sharpsville, Pa., plant of Cambria Slag Co., Sharon, Pa., died September 19. He was 83 years of age.

Edward F. Meyer, founder and secretary-treasurer of E. F. Meyer & Son, Killbuck, Ohio, died September 5 following a brief illness. He was 88 years old. Mr. Meyer had organized the industrial sand firm in 1902.

Fred B. Turrentine, owner and operator of the Coconino Stone Co., El Paso, Texas, died September 6 at the age of 55.

Percy P. Tyler, former president and a director of Gypsum Lime & Alabastine Ltd., Toronto, Ontario, Canada, died recently at the age of 79.

END



***"Perfect performance under conditions
that would ruin most engines!"***

**West Texas Construction Co. again selects
International UDT-817 for primary power**

Profitable experience with International power led this Texas roadbuilder to specify IH diesel power for his latest crushing plant. This heavy-duty operation calls for reducing caliche for road base. A small percentage of material from the pit is already "fine enough to float" and this creates considerable dust around the crusher. Some engines would choke to death in this atmosphere, but clean-breathing, super-sealed Internationals keep going for years.

"Conditions that would ruin most engines don't seem to bother our 817," says Foreman Al Harris. "We work continually in abrasive dust that often covers the engine and crusher so you can't see them. We haven't lost a minute from this engine in two years of steady operation at 300 yards per hour. Performance has been perfect!"

You put more dollars in the profit column with that kind of dependability—no repairs, no downtime, no headaches, no complications—just steady, economical power, day in and day out. Let your International Engine Distributor or Dealer show you how IH power can work for you. He'll give you full information on 62 models in the IH line—8 to 385 max. hp—stripped engines to complete power units. Call him today!

**INTERNATIONAL[®]
IH. ENGINES**

**International Harvester Co., 180 North Michigan Ave., Chicago 1, Ill.
A COMPLETE POWER PACKAGE**

INDUSTRY NEWS



This Charleroi customer is about to take home some cement



Another shovels his own sand—4 shovelsful per 100 lb.

Super-market service for building materials

Customers are flocking to a drive-in, self-service materials yard operated by the Charleroi Supply Dept., Keystone Div. of the Dravo Corp., at Bentleyville, Pa. Available now at reduced prices are cement, sand and gravel, lumber, concrete block, brick, roofing materials, pipe, plywood, wallboard, plaster and lime—and more items will eventually be added to the line.

After entering the yard and obtaining sales tickets, customers drive around a 500-ft. horseshoe-shaped route along which are stationed the various supplies. They load their own vehicles and are checked out at the exit. Only three men are needed to operate the yard, and Dravo has already decided that the "browsing" approach is a profitable one.

Ideal expands facilities into North Carolina

By May of next year Ideal Cement Co. should be prepared for cement storage, packing and shipping from three facilities in North Carolina. At Wilmington a marine transfer station will provide a concrete dock and four 120-ft. silos, 40 ft. in diameter. Some 20 miles up the Northeast Cape Fear River, at Castle Hayne, a terminal is underway which will eventually be part of a manufacturing plant. Here,

eight 141-ft. silos will have a capacity of 227,000 bbl., and the most modern equipment will be on hand for packing and shipping by barge, rail or truck. A smaller loading and storage terminal will be located at Fayetteville, N.C.

Before deciding to build a major plant at Castle Hayne, Ideal carefully tested the available raw materials at its Baton Rouge, La., plant. They met spec-

ifications amply and are found at the site in abundance. Plant equipment already in storage includes two 12-ft. diam. rotary kilns, which will measure 450 ft. when assembled; two 11 x 32-ft. mills, and two 2,000-hp. synchronous electric motors to drive them.

Warner Co. expands sales territory

On August 1, Warner Co., Philadelphia, Pa., opened a sales office for its lime and limestone division in the Raymond Commerce Building, Newark, N.J. Lehigh Materials Co., Tamaqua, Pa., a Warner subsidiary, will occupy space at the same location. Regional Sales Manager of the new territory is Ralph R. Mease.

Congratulations—Oregon firm has golden anniversary

Corvallis Sand & Gravel Co., Corvallis, Ore., celebrated its 50th year of successful operation August 2. The family-operated enterprise now has an annual payroll of over \$300,000, and runs a fleet of 50 trucks and 15 pieces of heavy machinery.

Back in 1911, J. H. Gallagher founded the firm to supply 300,000 cu. yd. of rock for building the railroad from Corvallis to Monroe. He headed the company until his death this past May, when his son, J. H. Gallagher, Jr., took over as president and general manager.

Please turn to page 42



You'll be getting a machine that can bulldoze, do "carry-type scraper" and grader work—and can give you power-shovel-like, pry-over-shoe break-out force for tough digging. This TD-9 Four-in-One is punching a hole into a West Virginia hill—for punch mining a 5' to 7' coal seam. Note that the operator gets full-sized, full-capacity, depth-controlled bulldozer action!

Only 4-in-1's take over for a whole "equipment spread"

Figure the thousands of dollars ahead you'll be by letting one International Drott Four-in-One take over for several specialized rigs. *One machine (with uses unlimited)—one investment—one operator.* That's streamlining for profit!

Dial your International Drott Distributor for a demonstration of a Four-in-One today!

International Harvester Company, Chicago 1, Illinois
Drott Manufacturing Corp., Milwaukee 15, Wisconsin



INTERNATIONAL®
DROTT®



You'll profit from positive clamshell bottom dumping—to handle all types of materials, in all kinds of conditions, even where obsolete buckets fizzle out. This fast-working TD-15 Four-in-One is saving an hour a day in bucket clean-out time, loading sticky clay. Opening the Four-in-One's clam pulls material from bucket surfaces; gravity down-pull assures prompt self-cleanout!



You'll clam-on to anything you want to move and handle it fast! This TD-9 Four-in-One clam-handling a tree does all the land-clearing and load-out work at a pit producing bank gravel. This "bucket with the bite" easily grabs, carries, and loads stumps, boulders, and other "impossibles"—with the "man in the seat" in full charge!

**"We are making 6B State Material
with our Eagle Log Washer . . .
up to 90 Tons per Hour!"**

**"10% Objectionable Material Content
Reduced to Less Than 1½%,"**

Says John Post Jr., John Post & Sons Co., Durand, Mich.

Many aggregate producers have found that the most economical, or often the only way to satisfactorily wash gravel or crushed rock is with an Eagle Double Log Washer, especially when tough insoluble clays or conglomerates are present—or any material too difficult to break up properly in an Eagle Screw Washer.

The corrugated paddles of the Eagle Log Washer scour and abrade the

material so that clay balls are broken down. The current of wash water rising from the bottom of the tub picks up the deleterious material removed by the scrubbing and floats it out of the tub. Clean, sound material is left.

The Eagle Log Washer at the plant of John Post & Sons Co. is efficiently and economically washing their

gravel so that it meets specifications covering Michigan State Highway Dept. 6B Material.

If insoluble clay in your deposit is giving you trouble check up on the Eagle Log Washer. Let us put a sample of your material through our Test Lab—know for sure what can be done. Write for details. Ask for a copy of Catalog 61 too!

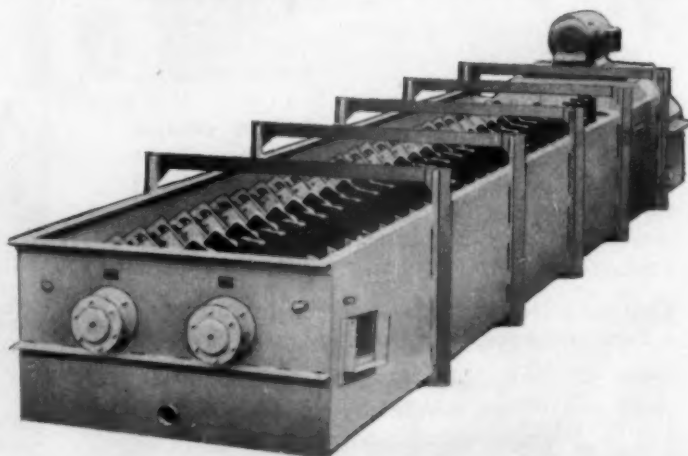
EAGLE IRON WORKS
137 HOLCOMB AVE., DES MOINES, IOWA

SINCE 1872



Look into the Eagle Log Washer

All over north America Eagle Log Washers are at work . . . year after year, assuring profitable operation for their owners. In case after case the Eagle has proved that bad material is only bad until it is made good . . . many pits and quarries considered hopeless were given a new lease on life when an Eagle Log Washer started churning muddy stone to make it come clean. The Eagle does it effectively and economically because of the good engineering and quality construction that is built-in. The maintenance-reducing Hydrotex Water Lubricated Lower Bearings are typical.



Industry News

continued from page 38

Portland cement production shows slight decline

For June and the first six months of 1961, portland cement production, mill shipments and stocks revealed a decline of one percent. Mill shipments this June of finished portland cement from 176 plants came to 33,739,000 bbl., compared with June 1960 totals of 34,045,000 bbl. However, considerable increases were

shown in the Colorado-Arizona-Utah-New Mexico and Puerto Rico districts. High-early-strength cement shipments were up 2 percent this June—1,356,000 bbl. as compared with 1960's 1,327,000 bbl. Prepared masonry cement shipments decreased 8 percent, from 2,175,000 bbl. to 2,002,000 bbl.

Production of all types of finished portland cement (including high-early-strength), by districts, in thousand barrels

District	June			January-June		
	1960	1961	Percent change from 1960	1960	1961	Percent change from 1960
Eastern Pennsylvania, Maryland	3,566	3,529	-1	16,020	14,720	-8
New York, Maine	2,003	1,867	-7	9,474	7,364	-22
Ohio	2,072	1,464	-29	7,243	5,835	-19
Western Pennsylvania, West Virginia	1,127	1,108	-2	4,708	4,146	-12
Michigan	2,507	2,510	—	8,204	9,060	+10
Illinois	921	816	-12	3,855	3,463	-10
Indiana, Kentucky, Wisconsin	2,033	2,028	—	8,062	8,243	+2
Alabama	1,123	1,162	+3	5,625	5,737	+2
Tennessee	827	825	—	3,594	3,815	+6
Virginia, South Carolina	765	701	-8	3,597	3,427	-5
Georgia, Florida	1,026	938	-9	5,964	5,212	-13
Louisiana, Mississippi	766	617	-20	3,344	2,917	-13
Iowa	1,297	1,361	+5	5,067	5,363	+6
Minnesota, South Dakota, Nebraska	884	988	+12	3,027	3,624	+20
Missouri	1,192	1,224	+3	5,457	5,033	-8
Kansas	721	831	+15	3,415	4,053	+19
Oklahoma, Arkansas	744	848	+14	3,281	4,228	+29
Texas	2,124	2,149	+1	11,435	12,210	+7
Colorado, Arizona, Utah, New Mexico	1,094	1,373	+26	5,296	6,632	+25
Wyoming, Montana, Idaho	303	286	-6	1,094	1,095	—
Northern California	1,454	1,418	-3	8,021	7,774	-3
Southern California	2,135	2,085	-2	11,900	11,878	—
Oregon, Washington	838	783	-7	3,783	3,554	-6
Hawaii	0	144	—	0	534	—
Puerto Rico	408	539	+32	2,649	2,875	+9
	31,930	31,594	-1	144,115	142,792	-1

\$2 million in wages down the drain

During 1959 and 1960 foreign cement dumping in the north-eastern states caused U. S. workers to lose over 600,000 man-hours and almost \$2 million in wages and fringe benefits, according to a union spokesman testifying before an open hearing held by the House Subcommittee on the Impact of Imports and Exports on American Employment. Time limits must be set, as delays in government action have sent "waves of ill feeling through the economy". Stanley H. MacArthur, vice presi-

dent, Glens Falls (N.Y.) Portland Cement Co., also testified, describing his company's losses. Recommendations were made for a three month limit for initial determination, four months for second determination, and one month to assess special dumping duties.

Wisconsin aglime groups meet

Four sectional meetings of the Wisconsin Aglime Producers Association took place during the week of August 14. The sessions

were highlighted by a speech by Dr. Richard Wiese, soils specialist, University of Wisconsin Extension Service, on the importance of aglime and the various factors influencing its quality.

Other officials attending the meetings were: Kenneth Hoover, state administrative officer, Wisconsin ASC Committee; Wilbur Zwettler, program specialist, U. S. Department of Agriculture; Gene Hruby, State ASC Office; Vic Brockmiller, Association president, and J. O. Smith, Association secretary-treasurer.

Expansion underway at Arkansas Cement Co.

Arkansas Cement Co., subsidiary of Arkansas-Louisiana Gas Co., is adding a raw grinding mill and four storage silos to its Foreman, Ark., plant. Combined capacity of the silos will be 60,000 bbl., and they will stand 115 ft. high.

Oregon outfit acquires pioneer territory

Reid Sand & Gravel Co., Bellevue, Ore., has purchased the Irving Tibbetts property in Issaquah. One of the finest sand and gravel locations in the Pacific Northwest, this property had been in the Tibbetts family since 1882. For the past six years, Issaquah Sand & Gravel Co. has operated it on a lease.

New aglime company opens in Alabama

West Alabama Lime Co. is now in operation between Geiger and Gainesville, North Sumter County, Ala. It produces 250 to 300 tons per day to serve farmers throughout the surrounding counties and in the eastern Mississippi area.

Please turn to page 47

Below: Another recent shipment of Thomas Durable
Dredge pumps to the Midwest.



Spectacular Acceptance of THOMAS PUMPS explained

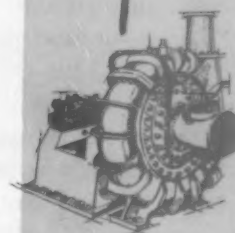
Acceptance of THOMAS DREDGE PUMPS by sand-and-gravel operators is spectacular. There must be sound reasons why THOMAS PUMPS are thus first choice in hundreds of cases. Some of those reasons include:

1. **NEW DESIGN:** Permits use of modern alloy (Thomas NI Hard) in manufacture of pumps, which results in maximum service.
2. **LONG LIFE:** Wearing parts in most cases last two to four times as long as manganese steel.
3. **HIGH PRODUCTION:** Close-running clearances and smooth contours insure higher efficiency.
4. **CONTROLLED MANUFACTURE:** Dependability is built-in. All parts of Thomas pumps are produced in our own plant by skilled craftsmen under supervision and control of our own metallurgists and engineers.
5. **CUSTOMER SERVICE:** Qualified and experienced Thomas pump engineers inspect customer's operation, study his needs and make recommendations.
6. **MAINTENANCE PARTS:** Prompt shipment from stock, usually within a few hours after the order is received.
7. **SIZES:** Full range of sizes, 6" through 16", discharge at bottom, top, right and left.

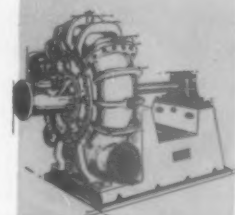
START PLANNING NOW FOR A NEW THOMAS PUMP
INSTALLATION FOR THE SPRING OF 1962. YOU WILL BE
GLAD YOU DID!

THOMAS FOUNDRIES, Inc.

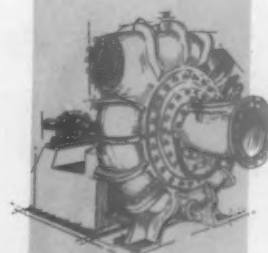
P. O. BOX 1111, BIRMINGHAM, ALABAMA



Vertical Discharge



Bottom Discharge



Top Discharge

Make more profit on the jobs ahead with...

SYMONS® CONE CRUSHERS

**FOR VOLUME PRODUCTION
OF QUALITY AGGREGATE**

These dramatic views of sections of the important new Illinois Tollway system serve as an outstanding example of the vast contributions to the progress of mankind being made by the construction industry. In huge construction projects such as this, specification aggregate has assumed an increasingly important role. To meet the constantly growing demand for vast tonnages of quality aggregate used in concrete and bituminous highways, Symons Cone Crushers are today, more so than ever before, the first choice of leading producers throughout the world. Symons Cone Crushers are also used in sand preparation operations.

For in aggregate and sand production . . . as in all of the great ore and industrial minerals operations the world over . . . no record equals the performance of Symons Cone Crushers that have so consistently produced, economically and efficiently, great quantities of finely crushed product resulting in higher profit per ton per hour.

Before you submit your next bid, get full information about Symons Crushers.

SYMONS . . . a registered Nordberg trademark known throughout the world



FOR STATIONARY PLANTS

Symons Cone Crushers, in Standard and Short Head types, are the choice of leading contractors and producers for primary, secondary and finer reductions in all types of aggregate operations. Available in sizes from 22" to 10' in dia., for capacities from 6 to over 1500 tons per hour.



FOR PORTABLE PLANTS

Symons Cone Crushers are being used in increasing numbers for portable and semi-portable crushing plants. View shows part of a Cedarapids portable crushing and screening plant, utilizing a Symons Cone Crusher. Unit is serving a large Texas aggregate producer.



(ABOVE:) Tri-level interchange of Northwest and Tri-State Tollways near Chicago's O'Hare International Airport.



(RIGHT:) View of the modern Northwest Tollway bridge crossing the Fox River near Elgin, Illinois.



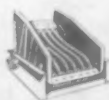
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crushers, etc.



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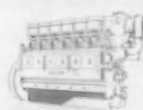
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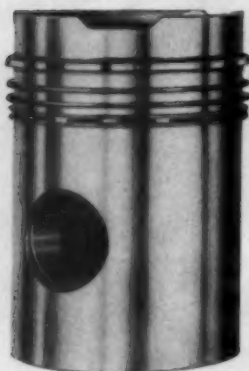


Special report to users of Caterpillar D7, D8 and D9 Tractors:



New Piston and Ring Combination Cuts Oil Consumption 33-50% ... Lasts Hundreds of Hours Longer!

4-RING DESIGN



NEW 3-RING DESIGN



What makes it so different? Look at the two Caterpillar-made pistons. Notice in the new design that *both* compression rings are now deeply seated in grooved cast iron (indicated in yellow) instead of only the top ring. Since cast iron is able to resist groove "pound out," both compression rings are held firmly *longer* in the correct position for maximum ring-to-liner sealing. Compression loss and blow-by *behind* rings and around grooves is delayed hundreds of hours, too.

The new intermediate compression ring is a "twist" ring, so-called because it changes position in the groove during the power stroke. It actually "twists" so its face has *greater sealing area* at the liner than regular rings—reducing the number of compression rings normally required. At the same time, it thins the film of oil left by the regular oil

control ring. This leaves less oil to burn away which contributes to the new piston's better oil control and longer ring life.

All rings now have a new look, too . . . *each and every* face is thickly chrome plated against wear. They are also "bright lapped" to such brilliance that any flaws can be easily seen and the faulty ring rejected. Such quality control assures almost perfect seating right from the start, eliminating break-in blow-by, slobbering and scuffing.

Cost? Pistons with the *extra* cast iron bands cost *slightly more*, but ring sets are less! Once you change over, your tractor maintains its power longer, your fuel and oil bills go down, and your next set of replacement rings will be less. Your Caterpillar Dealer has them in stock now.

Caterpillar Tractor Co., General Offices, Peoria, Ill., U.S.A.

CATERPILLAR

Caterpillar and Cat are Registered Trademarks of Caterpillar Tractor Co.

Diesel Engines • Tractors • Motor Graders • Earthmoving Equipment

Industry News

continued from page 42



ECSCA convention winds up with glowing forecast

Allentown, Pa., was the site of the July 20-21 Mid-Year Meeting of the Expanded Clay & Shale Association, enthusiastically attended by more than 60 persons. Executive Secretary T. R. Berger reported that competition is becoming increasingly keen, but that the "general feeling seems to be that the volume of the lightweight aggregate industry is on the way up and that by the end of 1961 our expanded clay and shale lightweight output will be at virtually capacity levels." He called on all producers to re-evaluate their plant efficiency and marketing techniques.

Three papers were presented during the session. Richard E. Miller, division sales manager of Lehigh Materials Co., Tamaqua, Pa., spoke on "Selling Lightweight Aggregates in the Smaller Sizes". Lucas E. Pfeifferberger, technical consultant for the Association, reported on recent activities of the American Society for Testing Materials and also gave preliminary details on an Association-sponsored research program to determine unit weights—to date impossible for architects to specify in service. Ernest Gruenwald, technical services manager for Lone Star

Cement Corp., New York City, discussed the growth and importance of lightweight concrete mixtures and wound up by describing his recent tour of the Soviet Union.

The Lelite heavy media preparation plant at Tamaqua and the strip mine operations of the Greenwood Breaker were toured as an interesting and informative windup to the meeting.

Eastern lime company becomes Pfizer division

Chas. Pfizer & Co., Inc., has acquired New England Lime Co., and will operate it as a division. The 112-year-old pharmaceutical and chemical manufacturer needs high-purity lime for processing citric acid, among other industrial chemical processes. Pfizer's product line will also be broadened by the purchase of New England Lime. The latter is headquartered in Adams, Mass., and also operates a subsidiary, Nelco Metals, Inc., in Canaan, Connecticut.

Two million-ton quarry added by Blue Rock

Blue Rock, Inc., road materials firm based in Washington Court House, Ohio, is planning to quarry high-purity dolomitic limestone near Cedarville. A long-term lease has been taken on the 350-acre site, which is expected to produce 2 million tpy.

Drummond Island quarry opens

Drummond Dolomite, Inc., Sheboygan, Wis., is now quarrying stone at Huron Bay on the south shore of Drummond Island, in Michigan. The quarry's reserve supply is estimated at 200 million tons.

Please turn to page 50

From Scalping...

...to Fine Screening

SYMONS SCREENS[®] are your best buy!

There is a Symons Screen built to do a better job at lower cost, regardless of your production requirements, from primary scalping to 60 mesh screening, or for dewatering. To suit your specific job requirements, choose from the wide range of Symons Screens including the Bar and Rod Grizzlies, Rod Deck Screens, Type F Horizontal Screens and V-Screen.

Plan wisely to meet increasing demands or to replace obsolete equipment by standardizing on Symons Screens and Grizzlies.

Write for bulletins.



NORDBERG
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Milwaukee 1, Wisconsin

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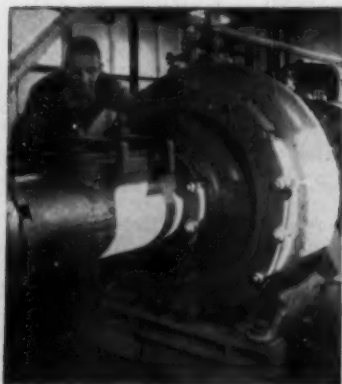
©1961, N.M.CO.

51551-1/3



Amsco dippers last longer loading ore cars. Owners of this mine have converted over 90% of their shovels to Amsco dippers like this 6 cu. yd. model because of their toughness

and resistance to abrasion. Excellent Amsco service had a part in the decision, too. This shovel loads about 6,300 tons of ore per 8-hour shift.



1000 hours of sand harvesting before major servicing. That's the record of this Amsco 8". It pumps 1,200 gallons of 15% sand solution per minute.



Amsco offers the widest available range of liner designs and special alloys for ball and rod mill liners to suit all conditions of impact and abrasion. Each mill is custom engineered for smooth flowing design and long liner life.



Crusher roll life is increased 5 to 10 times with "Pair for Wear" electrodes — Nicro Mang* for manganese steel welding and X-53 for general hardfacing.

*TRADEMARK REGISTERED

AMSCO WEAR PARTS

help you handle more tons per dollar

Impact and abrasion take their toll of wearing parts and cut deep into your profits. Worn dipper teeth, pumps, crusher rolls, dozer end bits and mill liners can cut *tons* off your production.

Amsco alloy castings include manganese steels, chrome-moly steels, multiple alloy engineering steels and high chromium iron—all developed to meet your specific needs whether it be impact, abrasion, or both. Each type is carefully guarded for proper chemical and physical properties and uniform heat treatment.

If wearing parts on machinery increase costs per ton you'd better investigate Amsco alloy wear parts. Your nearby Amsco representative can analyze your particular application and recommend an Amsco alloy product that will produce or move material at the lowest operating cost per ton. If you don't know his name, write and we'll send you his address.



Try this simple test made on this Massachusetts rock job: Two Amsco Simplex 2-part teeth were installed on the outside corners of a shovel dipper. Competitive 2-part teeth were installed between them. Midway through the test the positions of the teeth were changed. Simplex 2-part teeth showed *less than half the wear of competitive teeth*. Tips stay sharp and can be reversed in minutes.



They're backed by experience...

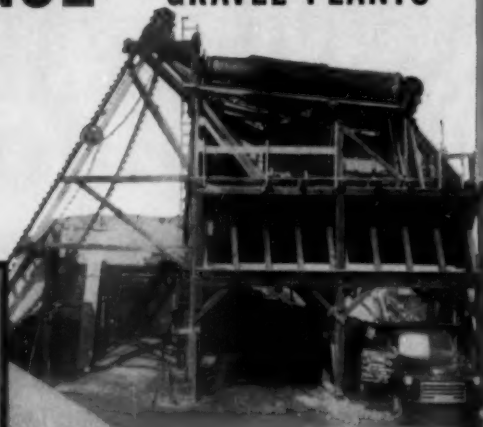
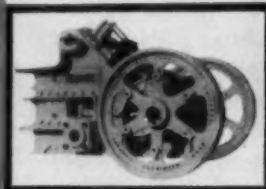
Other plants in:
Denver • Los Angeles • New Castle, Delaware
Oakland, California • St. Louis
IN CANADA: Joliette Steel and Manitoba Steel
Foundry Divisions
IN MEXICO: Amsco Mexicana, S.A.
Welding products distributed in Canada by
Canadian Liquid Air Co., Ltd.

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CHICAGO HEIGHTS, ILLINOIS

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**Heavy-duty
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- Lever-type jaw crusher has greater weight, more stability — saves you money on upkeep.
- Minimum abrasion — outlasts other designs 3 and 4 to 1.

- Long jaw plates — adjustable for all fineness ranges.
- Plants of 50 to 1,500 tons-per-day capacity, engineered to your needs. Backed by half century experience.

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A NEW BOOK by JAMES A. NICHOLSON

GIVES YOU THE SCORE

Single Copies only \$5.00 each.

Five to twenty copies \$4.00 each.

"Ready Mixed Concrete", is an historical, authoritative account of one of the fastest growing industries in the world.

Written especially for people in the *Ready Mixed Concrete Industry* the book is a harvest of factual information on every fundamental phase of the business.

Give a copy to every employee who has a hand in YOUR reputation for quality mixes, and in YOUR profits. Order your copies today.

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Industry News

continued from page 47

Permanente adds "50th State" distributing plants

Twin 2,000-bbl. distributing plants costing over \$200,000 are being constructed in Hilo, Hawaii, and Kahului, Maui, by Permanente Cement Co. Cement will be barged from the company's Waianae plant on Oahu, and will be sacked as well as dispensed in bulk at the new terminals.

U. S. Steel to market Gary slag production

Chicago area builders, manufacturers and farmers will soon have a different source of slag available. U. S. Steel Corp. is planning to market the blast furnace slag now processed by the Consumer Div., Vulcan Materials Co., at U. S. Steel's Gary (Ind.) works. This means that the company will be able to furnish aggregates for highway and building construction and concrete products, as well as for railway ballast and agricultural use.

Slag sales offices of U. S. Steel Corp. are located in Chicago; Gary and Whiting, Ind.; Pittsburgh, Pa.; Birmingham, Ala.; and Youngstown and Lorain, Ohio. G. M. Lakins, the company's Chicago district representative, reports experimental progress too.

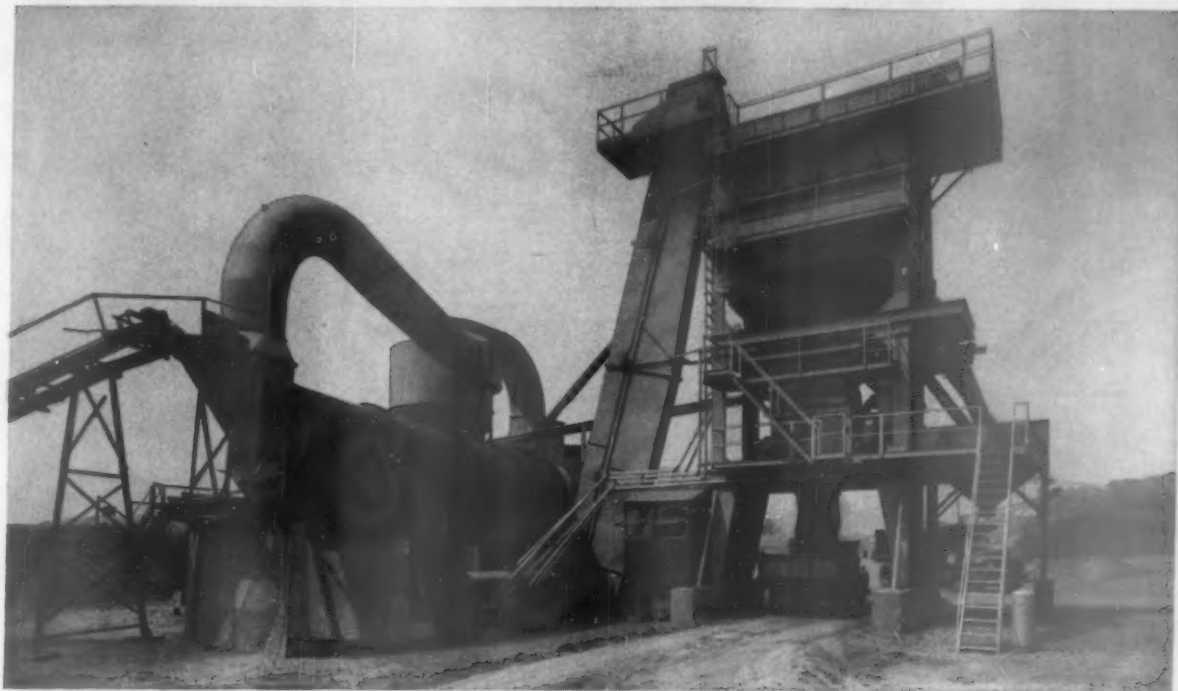
Pakistan to produce own white cement

A white cement plant capable of producing 15,000 tons annually is slated to go up at Daudkhel, West Pakistan. At present, builders have to rely on imports.

Lime sludge, available in abundance from a nearby fertilizer factory, will be used by the new plant as its raw material.

Please turn to page 53

THE USEFULNESS OF A LIMA MADSEN



5 tons of asphalt per batch to serve 3 lay-down machines

Lima Madsen has added the 10,000-lb. batch capacity stationary Model 581 plant to the top of its line of continuous-high-production asphalt plants. Rated output in excess of 300 tons hourly. Other models, portable and stationary, range in batch capacities from 1000 to 10,000 lb.

All Lima Madsens are clean operating—engineered and built for safety, long life and continual year-round operation. Designed for easy maintenance and accessibility—such as the exclusive externally replaceable sectional mixer liners. Fully automated

or remote controls are optional. Positive control by weight of every ingredient; rapid, thorough mixing. Patented pressure injection of liquid asphalt cuts mixing time 10 to 15%, reduces mix cycle to 45 or 50 seconds.

Unit design construction of factory-matched sections makes erection easy—whether portable or stationary models. Component equipment is available separately.

For detailed facts and figures, see your Lima Madsen distributor or write us for literature.

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LIMA MADSEN

Asphalt Paving Plants and Equipment

BALDWIN · LIMA · HAMILTON

CONSTRUCTION EQUIPMENT DIVISION · LIMA, OHIO

4129



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ROCK PRODUCTS, November, 1961

51

Industry News

continued from page 50

Perlite insulation board to be produced in Kentucky

Great Lakes Carbon Corp. plans to set up a \$3.5 million plant in Boone County, Ky., for the manufacture of a new type of roof insulation board made from expanded perlite and fiber. The plant will occupy more than 30 acres in the 900-acre Northern Kentucky Industrial Foundation property near Florence, and is the first operation to be granted a site in this area.

At present Great Lakes Carbon Corp., with main offices in New York City, operates 13 plants, 43 offices, and 3 research, development laboratories.

Bureau of Mines issues world laws on mining

The first single-volume guide to mining and petroleum laws of the world ever published is now available to the public. The 215-page volume lists reference sources, and federal and local jurisdictions separately. If some of the smaller nations are omitted, it is because their meager mineral resources are administered under agricultural or general industrial regulations. But prospective readers will be interested to know that the U.S.S.R. and Antarctica are covered.

Copies are available for \$1 from the Superintendent of Documents, Washington 25, D.C.

Kenya now exports cement

The first shipment of bulk cement ever exported from Kenya left the Bamburi factory of British Standard Portland Cement Co. in October, bound for Dar es Salaam, Tanganyika. This company, with its annual export of over 110,000 tons, has made cement practically Kenya's top export commodity.

Please turn to page 54

HERE'S THE ALL-NEW ALL-HYDRAULIC crawler-mounted C-350 REICH drill

NOMINAL HOLE SIZE — 2-4"

DOWN-PRESSURE — 10,000 lbs.

ROTARY SPEED — 0-200 rpm.

Versatile — prospects with diamond core bits or wire line tools . . . drills blastholes with 3-cone rotary bits or In-Hole Drills.

Maneuverable — can climb a 25% grade, turn in its own length . . . tram at almost 8 mph!

Stable — 14" wide tracks . . . exceptionally low center of gravity . . . 8' 8" wide frame, meet and beat any terrain.

Operator convenience — Control Console places every control at operator's fingertips . . . every movement within sight . . . and hydraulics do all the work — give infinite combinations of feed pressure and rotational speeds.



REICH drill

FRANKLIN (VENANGO COUNTY), PENNA.

Division: CHICAGO PNEUMATIC TOOL CO.



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Superior quarries praised for superior safety

Sixteen quarries of Superior Stone Co., division of American-Marietta Co., were winners or among the runners-up in the National Crushed Stone Association Safety Contest. The Contest, sponsored jointly by the Association and the U. S. Bureau of

Mines, divided the participating mines and quarries into five groups according to the total number of man-hours worked during 1960.

Groups III and IV were topped by Superior entries. In Group III (50,001 to 100,000 man-hours) the winner was Neverson quarry at Bailey, N.C. Bakers quarry at

Monroe, N.C., won the Group IV award, for 30,001 to 50,000 man-hours.

James Raybon and Donald Winchester are superintendents of the respective quarries. Safety director of Superior Stone Co. is Garland Midyette, Raleigh, and his assistant is W. H. Hinshaw, Greensboro, N.C.

NEW! EAGLE'S ROLL CRUSHER

This extra-rugged roll crusher by Eagle Crusher Company is one of the many reliable products in the Eagle Line, which includes jaw and roll crushers, portable crushing plants, cage and hammermills, conveyors, loaders.

The Eagle Roll Crusher shown below has roller bearings throughout. All steel gears running in oil.

Two sizes . . . 24 x 20, 30 x 24.

You are invited to consult with our engineers about your own particular problems. Eagle Crusher engineers have a rich backlog of experience to draw on when making equipment recommendations for your operations. Write today . . . tell us your problem. We'll be glad to help. No obligation.



EAGLE

JAW AND ROLL CRUSHERS, PORTABLE PLANTS,
CAGE AND HAMMERMILLS, CONVEYORS, LOADERS

CRUSHER CO., Inc. GALION, OHIO-U.S.A.

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Swedes try insulating with diabase

A Swedish-produced mineral wallboard claimed to be both fire-resistant and soundproof will soon be marketed by Karlholms AB, of the Swedish Cooperative Union. 1961 production is estimated to reach 10,000 tons, at a value of around \$2 million.

The board is made of diabase which is mixed with slag and heated to over 1,000 deg. C. It is then poured into a fast rotating disc, where a steam jet splits the fine drops into fibers. The fibers are elutriated in water before going through an impregnation process, sheet-forming and curing process.

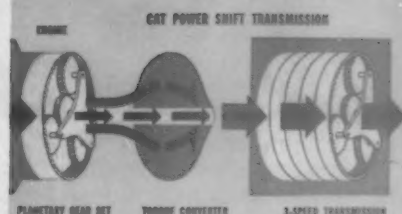
Columbia Cement to provide service from W. Virginia site

Nitro, W. Va., is the location for the first distribution center to be established by Columbia Cement Corp., Zanesville, Ohio. Columbia, a wholly-owned subsidiary of Pittsburgh Plate Glass Co., hopes to be able to operate the center by fall.

The cement will be shipped by rail from the Zanesville plant and stored in three precast concrete stave silos. The silos are 42 ft. 6 in. high, 20 ft. diam., and have a combined total capacity of 10,000 bbl. All processes can be operated by remote control, and modern dust collecting equipment will also be installed.

Please turn to page 56

Enter 1046 on Reader Card



The exclusive Cat power shift transmission works like this: The engine drives planetary gears in the flywheel, where output torque is divided. Part of it is routed to the transmission through a torque converter (providing anti-stall and load-matching ability). Part goes direct to the three-speed transmission (provides economy and fast response of direct drive). It's one ton of muscle built with the precision of a fine watch.

WITH CAT POWER SHIFT TRANSMISSION IN A D8H, A MAN'S FINGER TIPS CAN CONTROL 30-50% MORE PRODUCTION

Your present equipment may move material at low cost—but here's one reason a D8 Series H Tractor may move it a lot cheaper.

It's the Caterpillar power shift transmission—the only transmission available that combines the advantages of direct drive, torque converter drive and power shifting in a single unit. It greatly increases operator efficiency—offers important new opportunities for broadening your profit margin.

Here's how this big step ahead in transmission design helps your operator get more work from the machine: A single selector lever replaces the familiar master clutch, gear change and forward-reverse levers. Using this single selector lever, the operator can shift on the go in a split-second even under full load. He changes speed or reverses direction with finger-tip ease . . . without clutching . . . without braking . . . without even lifting his arm from the arm rest. And the lever is mounted for left-hand control, leaving the right hand free for maneuvering the tractor or controlling the dozer, ripper or scraper. Convenience makes it easy to choose the right speed at the right moment.

Matching this ease of control are safety features you'll like. A safety lock in the selector housing holds a parked machine in neutral while the engine is running. Another safety device automatically shifts the

selector lever to neutral when the engine is stopped.

The simplicity and safety of the Cat power shift transmission make your good operators even better and less experienced operators more effective. They can take greater advantage of the tractor's power and capacity to speed the work. And ease of operation keeps their efficiency high throughout the day.

Cat power shift transmission also means a big jump in your machine's efficiency too. You'll particularly notice the difference on jobs where frequent shifting is the rule—such applications as feeding a shovel or short-cycle dozing.

For instance, in dozing, the operator starts to pick up the load in second gear—then shifts on the go to first for full lug yardage. There's no clutching, no lost time or momentum when changing speeds. An easy move back to second drifts the material to its destination. Another move of the lever puts the machine in high-speed reverse for fast return to the digging area.

Machine efficiency is *always* high. Cat power shift transmission provides the needed power at the highest possible speed. Its exclusive torque divider design combines the snap and economy of direct drive with the load-matching ability and anti-stall characteristics of torque converter drive—and three forward-

reverse speeds tailor it to the entire working range.

Just how much of an increase will the Cat power shift transmission make on your job? This will depend on your application. On short-cycle dozing, reports in our file show increases as high as 50% over similar-sized machines with other transmissions. Some users flatly state they will never buy another track-type machine in the 200 HP class unless it is a Cat power shift unit.

Power shift transmission is just one reason the D8H may be a far better profit tool than the machine you are now using. There are other features of this 235 HP turbocharged tractor that could be equally advantageous in your work. Your Caterpillar Dealer will welcome the opportunity to discuss the D8H in terms of your job and present facts and figures so you can determine true benefits. And if a demonstration with measured results would help, he will be glad to make arrangements.

Call him today.

Caterpillar Tractor Co., General Offices, Peoria, Illinois, U.S.A.

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**STEP UP PRODUCTION
AND PROFITS WITH POWER
SHIFT TRANSMISSION**

Industry News

continued from page 54

Minerals of California now up-to-date

A new Supplement, containing additions to California mineral localities during 1955-1957, is now available for the state Division of Mines bulletin Minerals of California. Professors Joseph Murdoch, University of California at Los Angeles, and Robert

W. Webb, University of California at Santa Barbara, are responsible for these works.

During the period covered by the Supplement, three previously unknown minerals—galeelite, gerstleyite and nekoite—were discovered, and 23 mineral species were reported in California for the first time. Uranium and

rare-earth minerals have multiplied in frequency, and at least 15 of the minerals new to the state are radioactive rare-earth minerals.

Quality control emphasized by Chicago vermiculite men

The Vermiculite Institute of Chicago is striving to assure top quality in nationwide installations of vermiculite concrete roofs. Member companies are contracting with approved roof deck applicators to assume responsibility for the quality of the finished deck, and to install it in strict accordance with Institute specifications. These applicators will receive annual certificates, and will be listed in a roster for architects, engineers and general contractors.



Lining kiln section with Plicast
cuts installation costs 27.3%
... cuts downtime by 15 days

... AT NORTHERN LIGHTWEIGHT AGGREGATE, INC., COHOES, N. Y.

REPAIR YOUR KILN LINING ECONOMICALLY . . . get back in production fast with Plicast castable refractories. Northern Lightweight did it.

Recently Northern Lightweight relined their entire kiln, using Plicast Tuff-Mix in the pre-bloating zone and Plicast K-L Mix in the semi-bloating zone. Poured in place, these abrasion resistant castables hugged the steel casing tightly, even where the kiln was out of round. And this monolithic lining is positively anchored, too.

CONSIDER THE ECONOMY . . . in place cost for Plicast in these two zones was 27.3% less than bricking.

CONSIDER THE SPEED . . . placed in 8 days, the Plicast lining saved 15 valuable production days.



CATALOG 73 illustrates Plibrico kiln and dryer applications



PLIBRICO COMPANY

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Canadian Plant: New Toronto, Ontario

Sales and Service Throughout the World

1262

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STATEMENT REQUIRED BY THE ACT OF AUGUST 24, 1912, AS AMENDED BY THE ACTS OF MARCH 3, 1933, JULY 2, 1946, AND JUNE 11, 1960, (74 STAT. 208) SHOWING THE OWNERSHIP, MANAGEMENT, AND CIRCULATION OF ROCK PRODUCTS, published monthly at Chicago, Ill., for October 1, 1961.

1. The names and addresses of the publisher, editor, managing editor, and business manager are:

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Editor—George C. Lindsay, 79 W. Monroe St., Chicago 3, Ill.

Managing Editor—Charles R. Kluge, 79 W. Monroe St., Chicago 3, Ill.

Business Manager—P. D. Allen, 79 W. Monroe St., Chicago 3, Ill.

2. The owners are: Maclean-Hunter Publishing Corp., 79 W. Monroe St., Chicago 3, Ill., and Maclean-Hunter Publishing Co., Ltd., 481 University Ave., Toronto, Ont., Canada.

3. The known bondholders, mortgagees, and other security holders owning or holding 1 percent or more of total amount of bonds, mortgages, or other securities are: None.

4. Paragraphs 2 and 3 include, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting; also the statements in the two paragraphs show the affiant's full knowledge and belief as to the circumstances and conditions under which the stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner.

5. The average number of copies of each issue of this publication sold or distributed, through the mails or otherwise, to paid subscribers during the 12 months preceding the date shown above was: 16,776.

P. D. Allen
Publisher

Sworn to and subscribed before me this 20th day of September, 1961.

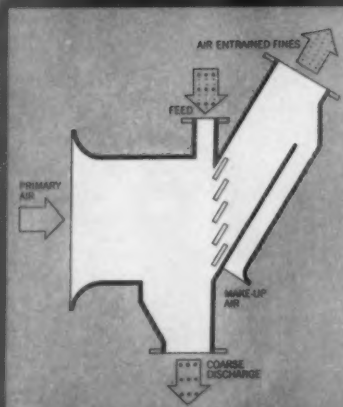
[SEAL]

June G. Martin
(My commission expires January 31, 1965.)

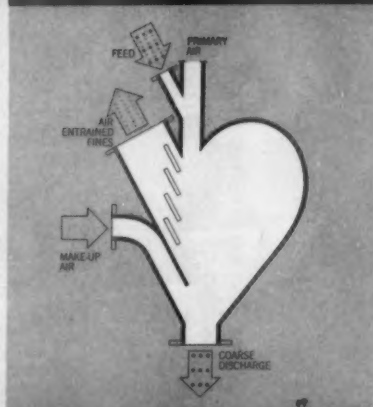


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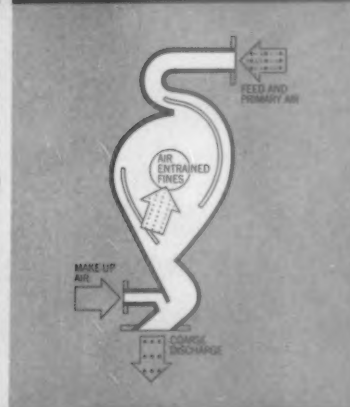
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Gravitational Classifier — Replaces screens and sieves in the 20 to 65 mesh range with comparable or better efficiency. Low maintenance, instant control of cut point and limited space requirements.



Gravitational-Inertial Classifier — Extremely high efficiencies for separation in 65-200 mesh range. Pneumatic conveying and elevating of feed and fines, no moving parts, single damper to control cut points.



Centrifugal Classifier — Unmatched performance in the 200 mesh to 20 microns size range. No moving parts, easy adjustment of cut points, and pneumatic conveying and elevating of feed and fines.

Classifiers can be operated in series to obtain several closely sized fractions in one continuous operation.



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Initial link is hauling raw limestone to primary crusher. At Ideal Cement's Ada, Okla., plant, fleet of LVX Mack four-wheel dumpers keeps three shovels, including big six-yard dipper, hustling.

STRONG LINKS

in the cement-making chain

With seventeen manufacturing plants, **Ideal Cement Company** is a leading cement producer in the U. S. In the past two years, Ideal has opened new plants at Ada, Oklahoma, and Tijeras, New Mexico.

Each of these new plants is a continuous unbroken cement-making chain. Strong links in these chains are the Mack trucks used to carry limestone from quarry face to crusher. At Ada, for example, Mack LVX's keep pace with three shovels, providing a constant supply of raw material. At its Tijeras quarry, Ideal depends on LRX Macks.

Macks make these all-important links stronger because they are far less likely to fail prematurely . . . require far less maintenance attention . . . and operate at remarkably low cost per ton hauled.

The reasons are easy to recognize. Mack compo-

nents such as Mack-built transmissions . . . axles . . . frames . . . make up a vehicle that stands up and keeps coming back for more when pitted against truck-punishing jobs.

Make sure you have all the truck you can get under your shovels. Put a Mack to work. Mack four- and six-wheel off-highway dumpers from 15- to 45-tons capacity really put muscle into your quarrying operation. Mack Trucks, Inc., Plainfield, New Jersey. Mack Trucks of Canada, Ltd., Toronto, Ontario.

6201

MACK

FIRST NAME FOR

TRUCKS

Discharging its load into apron feeder, Mack LVX will soon be ready for return to shovel. Quick spotting at shovel and dump site attests to Macks' maneuverability, good driver vision.

Raw material of portland cement, limestone, is loaded into Mack LRX dumper at Ideal's new Tijeras, N. Mex., plant. Despite grueling pace, Macks require minimum time out for maintenance . . . return long, trouble-free life.



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OUT-PERFORMS
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Extra life and wearability are FORGED into the "Cape Ann" Drop Ball for efficient, economical performance. FORGED and heat treated from tough abrasion resisting steel. "Cape Ann" Drop Balls are Sonic Tested before shipment and are fully guaranteed.

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CALENDAR

of coming events

1961

Nov. 30-Dec. 1, 1961—Fourth Rock Products Conference, sponsored by Kansas Limestone Association, Inc., State Highway Commission, State Geological Survey, and University Extension, University of Kansas, Lawrence, Kan.

December 7-8, 1961—Missouri Limestone Producers Association, Annual Meeting, Governor Hotel, Jefferson City, Missouri

1962

January 12-13, 1962—Expanded Clay & Shale Association, Annual Meeting, Deauville Hotel, Miami Beach, Fla.

January 15-19, 1962—National Limestone Institute, Inc., Meetings, Roney Plaza Hotel, Miami Beach, Fla.

February 5-9, 1962—American Society for Testing Materials, Committee Week, Sheraton-Dallas and Statler-Hilton Hotels, Dallas, Texas

February 5-9, 1962—National Sand and Gravel Association—National Ready Mixed Concrete Association, 32nd Annual Convention and Biennial Show, McCormick Place Exposition Center and Conrad Hilton Hotel, Chicago, Ill.

February 11-15, 1962—National Crushed Stone Association, Annual Meeting & Exhibition, Conrad Hilton Hotel, Chicago, Ill.

February 18-22, 1962—American Institute of Mining Engineers, 91st Annual Meeting, Statler Hotel, N.Y.C.

April 3-5, 1962—American Institute of Electrical Engineers, Cement Industry Technical Conference, Chase Hotel, St. Louis, Mo.

April 12-14, 1962—Pacific Southwest Minerals Industry Conference (AIME), Palace Hotel, San Francisco, Calif.

May 3-5, 1962—Fifth Rock Mechanics Symposium, jointly sponsored by the mining departments of Colorado School of Mines, Missouri School of Mines and Metallurgy, Pennsylvania State University and University of Minnesota; held at University of Minnesota Institute of Technology, Minneapolis, Minn.

June 18-21, 1962—National Limestone Institute, 17th Annual Convention, Statler-Hilton Hotel, Washington, D.C.

REPORT FROM WESTERN MATERIALS INC., PAMPA, TEXAS



"Our new 944 Traxcavator loads and levels nine 18-yd. trucks an hour

It gets its bucket full easier than other machines, is faster and handles better. Has plenty of reach for big trucks, too."

THAT'S the word on the 944 from Craig Childers, Western's Plant Superintendent. And here's what the operator thinks about it, "I like the way it handles. It's really a fast-loading machine; and it has good balance and visibility. The idea of having the lift arms out front where you don't sit between them is great."

You can choose from three sizes in the new Traxcavator line. The 944 packs 105 HP and a 2 cu. yd. standard bucket—the big 966 at 140 HP carries a 2¾ cu. yd. standard bucket—and the 80 HP 922 has a 1¼ yd. bucket. All three mount a variety of buckets and attachments for handling various materials. And all three have what it takes to move more tons per hour and stay on the job month after month with far less maintenance.

Your Caterpillar Dealer has all the facts. Ask him to set up a Traxcavator demonstration on your job, and get a firsthand look at all the new ideas that are built into these machines. It'll be a real eye-opener.

Caterpillar Tractor Co., General Offices, Peoria, Ill., U.S.A.

CATERPILLAR

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**TRAXCAVATORS
ARE MAKING OTHER
LOADERS OBSOLETE**

Here's how the 922, 944 and 966 are built to do a better job for you.

CAT DIESEL ENGINES—Turbocharged for efficiency and quick acceleration. Optional gasoline engines for the 922 and 944.

CAT POWER SHIFT TRANSMISSION—gives instant shifting, forward and reverse, 1st and 2nd speeds. High and low range selector also provides two-wheel drive for roading, four-wheel drive for power and traction in work cycles.

OPERATOR SAFETY—Lift arms and cylinders are forward of the operator and cockpit. Visibility is excellent and access is easy... up three wide steps.

LONG REACH—With the lift arms up front, the reach at dumping height of the new Traxcavators is impressive: 57" on the 966, 51" on the 944 and 41" on the 922.

OPERATOR CONVENIENCES—Bucket controls have automatic positioners to speed every cycle; machine controls are all power boosted for easy operation. Dual brakes give operator choice of braking with or without transmission engaged.

FULL LINE OF ATTACHMENTS—Special material buckets, side dump buckets, forks, cabs, etc.

RAY-MAN CONVEYOR BELT



RAY-MAN CONVEYOR BELTS On Giant Wheel Excavators Move Overburden More Than 400 Feet ... At 5100 Tons Per Hour!

High-speed belt conveyors, with huge carrying capacities, are an integral part of this new 1,600 ton wheel excavator built for Peabody Coal Company at Bucyrus-Erie Company. High conveyor speeds—over 1,000 FPM—and high impact, put a tremendous strain on belt and belt splice. Ordinary belts can't take it. Ray-Man Conveyor Belting met the production standards of Peabody's giant earthmover—to handle *full* loads of overburden at *full* speeds *without* costly downtime for splice repairs!

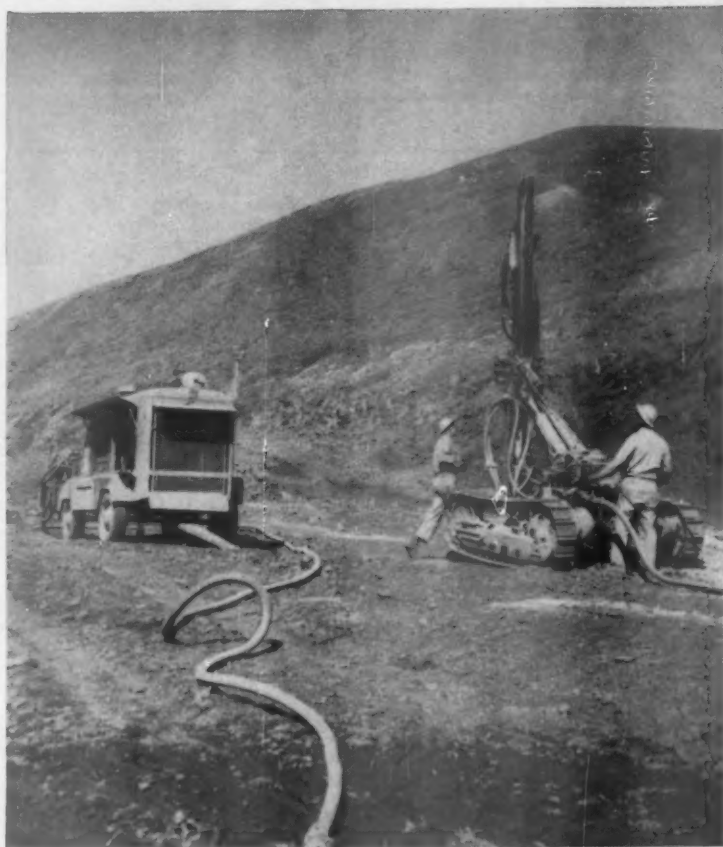
Ray-Man belts on other machines of this type have hauled over 12,000,000 tons—outperforming all competitive belts. Splices last twice as long because double ply compensation relieves outer ply stress at bends. Ray-Man trains naturally, resists impact and ripping, requires no breaker ply. Exclusive XDC cover prolongs belt life. Let an R/M distributor show you how an R/M Conveyor Belt can outperform other belts on *your* conveyors. Write for Bulletin M302 and Catalog 25CB.



OVER 900 FT. OF 54" RAY-MAN CONVEYOR BELT are required for digging ladder and stacker conveyors on this huge Bucyrus-Erie Wheel Excavator. Machine will help increase output a million tons annually at Peabody Coal Company's River King Mine near Freeburg, Illinois.



RAYBESTOS-MANHATTAN, INC.
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HOMOFLEX HOSE

Weighs Less Than Any Other Hose For Equal Pressure

It's flexible as a rope, too... the easiest handling air hose you can use. Homoflex has no pre-set twist... coils and uncoils in *any* direction *without* kinking. Strength member and tube are virtually inseparable. Uniform inside and outside diameters make it easier, *safer* to couple.

- **Super-Strong** — assures longer, trouble-free service life
- **Precision Built** — with super-strength, low-stretch cords
- **Mandrel-Made** — no pre-set twist
- **Kinkless** — coils and uncoils freely in any direction
- **Homogeneous Construction** — provides inseparable tube-to-cover bond
- **Safer, Easier To Couple** — inside and outside diameters are uniform

Ask about rugged Homoflex and other types of R/M hose for your applications. Write for Bulletins M620 and M694.

R/M POLY-V[®] DRIVE

More Power in Less Space ...With More Reliability

A single, endless V-ribbed belt across full width of sheaves with mating grooves. Gives more power per inch of width and advantages never possible with conventional multiple belt drives.

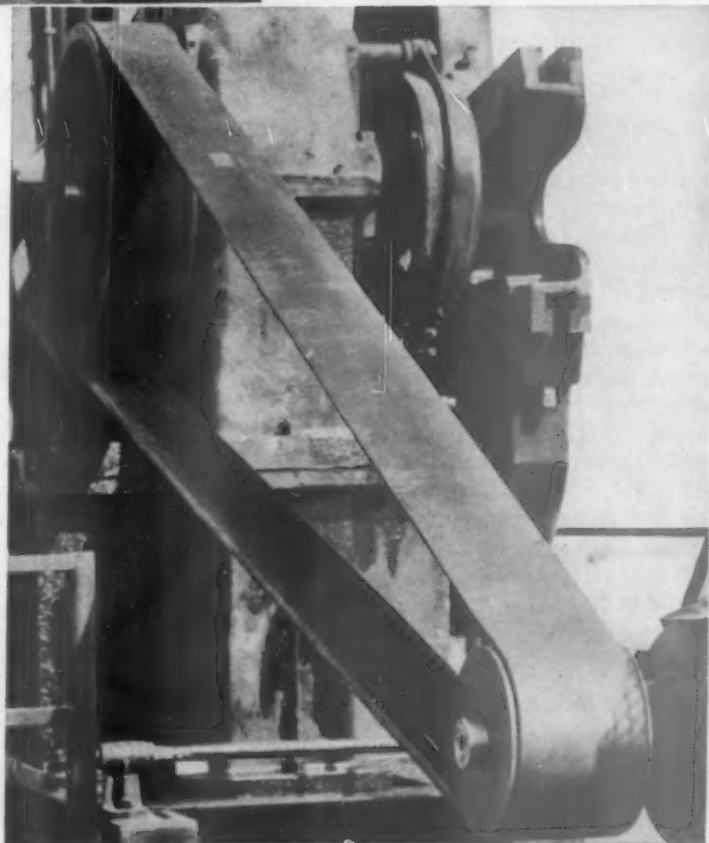
- **Simplicity** — two belt cross sections meet *every* heavy duty requirement
- **Reliability** — less maintenance, less take-ups... longer belt and sheave life
- **No Matching** — single unit belt eliminates "length matching"
- **Better Performance** — maintains groove shape, constant pitch and speed ratios... runs smoother, cooler

WHEN YOU CHANGE DRIVES CONVERT TO POLY-V[®]...AND BE SURE.

Write for Bulletin M141.

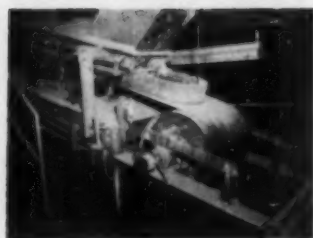
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RM110R



HINTS & HELPS

Profit-making ideas developed by operating men



Terminal design

This takeup end of a conveyor in a midwestern cement plant represents a high degree of design sophistication. For one, the steel skirt plates are carefully secured to the dust-tight chute assembly and the whole setup is braced from the conveyor frame.

Material is prevented from rolling down the incline with a U-shaped segment of rubber shirt board. To prevent abrasion of the surface of the conveyor belt, this segment is suspended from the chute with a steel rod.

Safety features include a push-button, a rope switch and a pair of tell-tale switches that cut the power if the belt wanders off course. Finally, a rotary switch projecting from the tail shaft sends a continuous signal to the central control panel. If the tail shaft stops while the drive motor is turning, an alarm sounds in the control room and a red light indicates the conveyor that's in trouble.

Front-end loader platform

When a Minnesota sand and gravel concern's maintenance man needs a ladder he usually calls for a front-end loader. This

big bucket is much more stable than a ladder, and he is able to take all the tools and parts he needs in the big bucket. When there's a motor or drive to be replaced, the old material can be slid off into the bucket and the new put into position.

Loading chute

A midwestern sand and gravel producer knows well the merits of steep chutes when handling

damp or wet aggregates. But he also knows from disastrous experience that these wet materials can also cascade down the chutes to swamp the following conveyor.

The answer to this sticky problem was a chute that was steep enough but which had retarding shelves welded into place. These shelves hold just enough material to prevent swaying. At the same time, they prevent destructive abrasion and rapid wear on the bottom of the chute.

Radiation pyrometers protect kilns



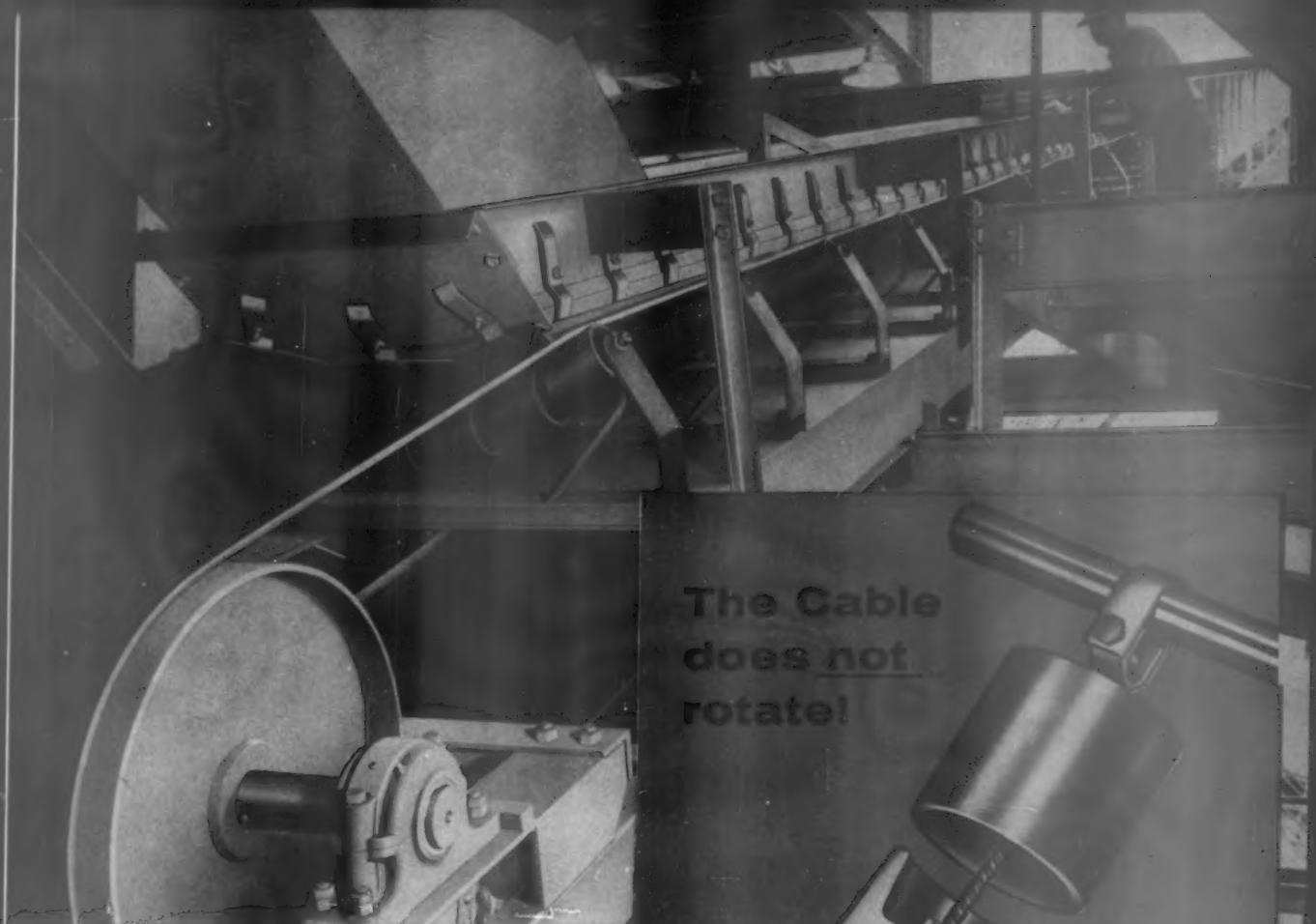
Heat-sensitive instruments have been available for several years and a number of cement and lime producers have found them invaluable. Possibly the most common instrument is the "fixed" type. (upper photo) This is installed in a location close to the hot zone of a rotary kiln and fixed to sense the radiation from what is calculated to be the hottest area.

A recently offered innovation is a pivoting pyrometer. By



scanning a large circle, it overcomes any deficiencies in estimating the zone most likely to get overheated.

A middlewestern cement plant has carried this idea one step further. The heat-sensitive "eye" is mounted on rails, and travels about 35 ft. along the hot zone. This ingenious idea has been so successful that the travel distance is being extended another 50 ft. to greatly extend the instrument's usefulness. **END**



That's why you get Greater Belt Life... Less Maintenance

McNally Pittsburg conveyor design adds big tonnage to your belts, cuts power costs, spares you many dollars in maintenance time and replacement parts. The secret of these savings lies in the patented cradle idler design. Big 5" rubber rollers are suspended in a true catenary, on flexible, stainless steel wire rope. They follow the belt contour, deliver deep troughing action, extend belt life and cut spillage.



Only the rollers rotate. The wire rope is supported at each end by a simple ball joint. It moves freely, adjusts to any belt contour, and provides uniform belt support without any bends or creases. Since the rope does not rotate with the rollers, harmonics are eliminated. The rollers ride on precision-ground ball bearings, which are prelubricated and sealed for life. And you can replace the rollers one at a time if they wear. Easy to erect and maintain—costs less to operate.

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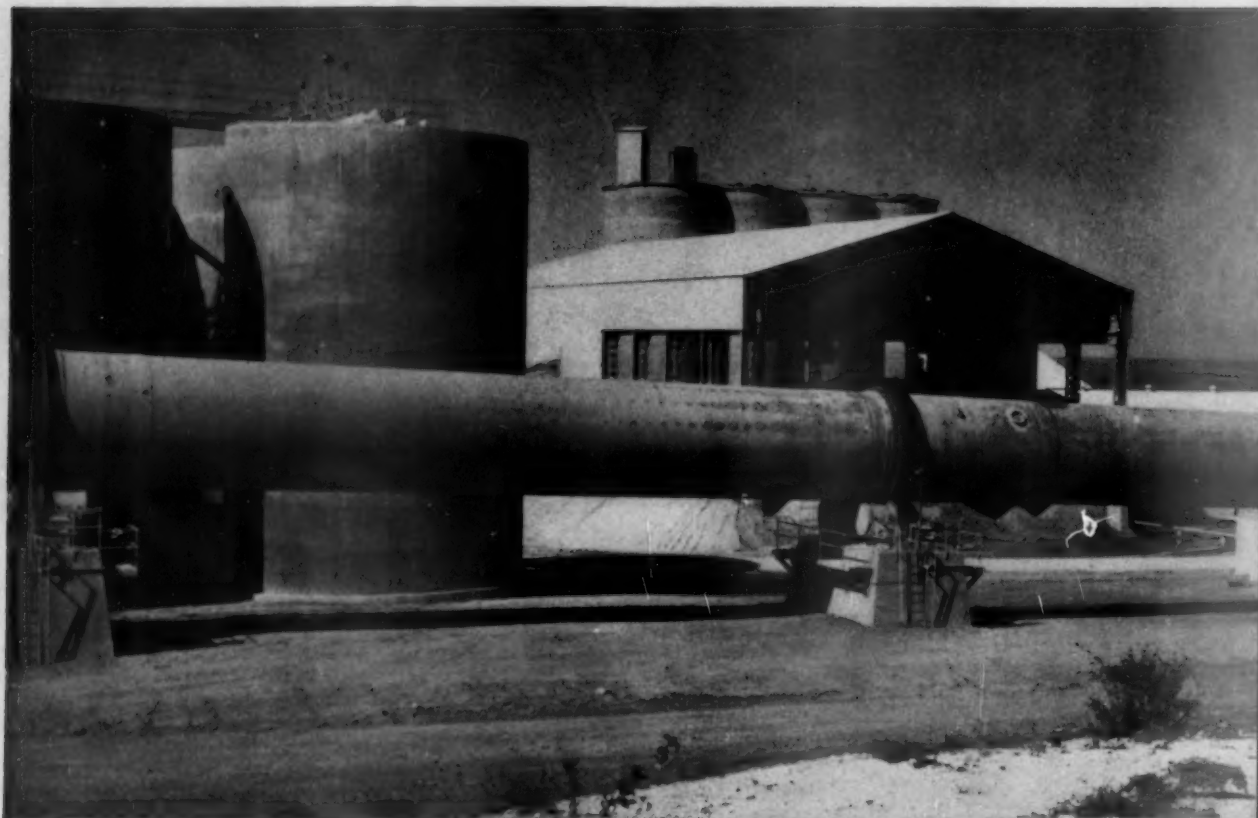
- ☐ Please send information on the new McNally Pittsburg Belt Conveyor.
- ☐ Have Sales Engineer call for further consultation.

NAME _____ TITLE _____

COMPANY _____

CITY _____ STATE _____

New 4,000 BBL/Day Cement Plant Integrates Fuller Equipment



Texas Industries of Dallas Achieves Unusually Low Capital Outlay And Operations Economy By Specifying Quality Equipment

Designing on the basis that true economy in cement plant design considers operation and maintenance costs along with capital outlay, Texas Industries, Inc., with its consulting engineers, selected Fuller equipment for its new cement plant at Midlothian, Texas.

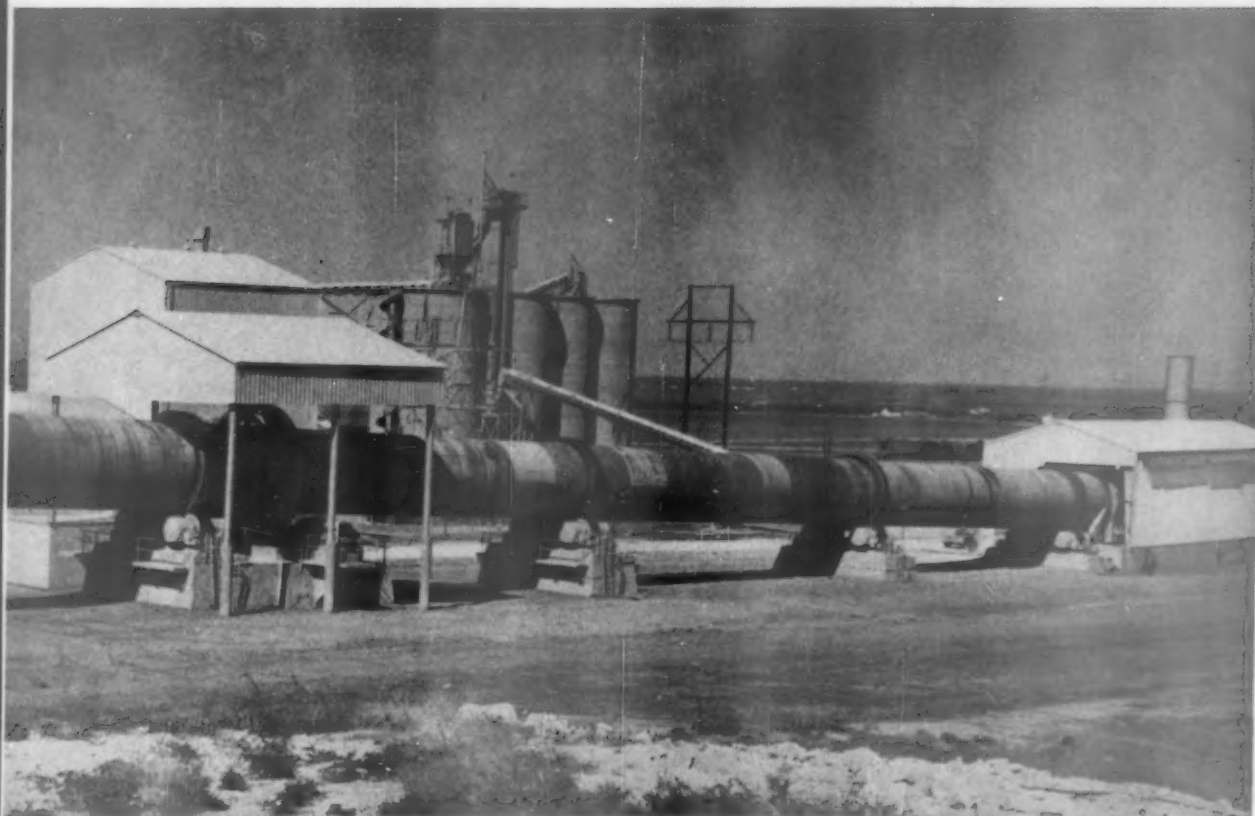
To meet specifications, the following major equipment items were integrated into this modern wet process plant: a Traylor 12 x 450 rotary kiln, a Fuller 8 x 44 horizontal grate cooler, a Traylor 1,500 HP raw mill and a 2,000 HP finish mill, in addition to Dracco multibag dust collectors, Fuller-Kinyon and Airslide fluidizing conveying systems, Fuller rotary compressors, Sutorbilt blowers, Lehigh induced draft fans, Fuller control panels, and auxiliary items.

Unified responsibility provided by Fuller helped to effect simplification of plant design and layout. The result: improved engineering liaison and procurement; significant savings in capital outlay and efficient operation.

Fuller's wide range of major cement plant components provides these advantages for leading cement producers. Behind the quality and systems compatibility of Fuller cement plant equipment is a coordinated research effort. The Fuller Research Department has made significant contributions to the industry. Investigate how Fuller unified responsibility and experience can mean substantial savings in capital costs and increased operational efficiency for you.

4184
G-249T

into Low Cost Design



FULLER EQUIPMENT AT TEXAS INDUSTRIES NEW PLANT

- Fuller-Kinyon Pneumatic Conveying Systems
- Fuller Airslide® Fluidizing Gravity Conveyors
- Fuller Control Panels
- Fuller Horizontal Cooler With Clinker Breaker
- Fuller Two-Stage Rotary Compressor
- Fuller Duplex Compressor
- Fuller Bin Signals
- Fuller Rotary Valves
- Fuller Rotary Feeders
- Fuller-Kinyon Diverting Valves
- Traylor Rotary Kiln 12 x 450
- Traylor Two-Compartment Raw Mill, 1,500 HP
- Traylor Two-Compartment Finish Mill, 2,000 HP
- Dracco Multi-Bag Dust Collectors
- Dracco Valves
- Sutorbilt Blowers
- Lehigh® Fans

"See Pit & Quarry Handbook for details and specifications"

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This new H-120 Series "B" PAYLOADER has many improvements

which give added capacity, more digging power, better stability, lower maintenance and increased production

Since its introduction two years ago, the H-120 PAYLOADER has been acclaimed by contractors, materials producers, industrial users and their operators, for its reliable performance, high production and ease of operation.

Now, HOUGH's continuous program of research, development and refinement has made this series "B" model an even better investment.

Added Capacity: Operating capacity is increased by 25% to 15,000 lbs. and bucket capacity is increased by 17% to 5 cubic yards. (S.A.E. rated)

Extra Stability: To supplement the increased capacity extra stability and balance have been achieved with a longer wheelbase, wider tread and continued use of dry ballast (100% heavier by volume than liquid) in rear tires which gives a lower center of gravity.

More Hydraulic Capacity: The capacity of both the main hydraulic pump and the steering pump has been increased, a total of 22%. This provides more reserve hydraulic power for lifting and break-out action and assures easy steering action even when the engine is idling.

More Digging Power: The increased hydraulic capacity and refinements in the boom geometry provide greater mechanical leverage for digging while maintaining lifting speeds.

Lower Maintenance: The loader mechanism features the same simplified design with a single bucket tilt cylinder and a minimum of pivot and grease points and fewer parts to service and maintain. There are actually from 4 to 10 fewer pivot points than on competitive units. Furthermore, all boom, bucket and steering pivot points have "O" rings or other seals to keep grease in and dirt out. A set of only three different hoses will service the entire loader hydraulic mechanism.



PAYLOADER is convertible to this D-120B PAYDOZER

Keep-clean Hydraulic System: A valuable and exclusive HOUGH feature is the closed and pressure-controlled hydraulic system to keep out air-borne dust and moisture. The new cylindrical, vessel-type reservoir has extra strength and the entire top is easily removed for thorough servicing. There is a full-flow filtering system with three micron filters.

"No-Stop" Full Power-shift Transmission: This HOUGH-built transmission is thoroughly proven to be without equal in the tractor-shovel industry. It is full-reversing, constant-mesh with four speed ranges in each direction. All shifts, up or down, forward or reverse, can be made "on-the-go" without stopping for any "range-shift" engaging of gears.

Convertible to a 'Dozer: The H-120 Series "B" has many other features and advantages, many of which are exclusive. These include the ability to convert it, quickly and economically, to a powerful pusher-dozer. With its 300 hp engine, high dumping clearance and long reach it is the best buy in big tractor-shovels.

Your HOUGH Distributor is ready to prove it to you.

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705 Sunnyside Ave., Libertyville, Ill.

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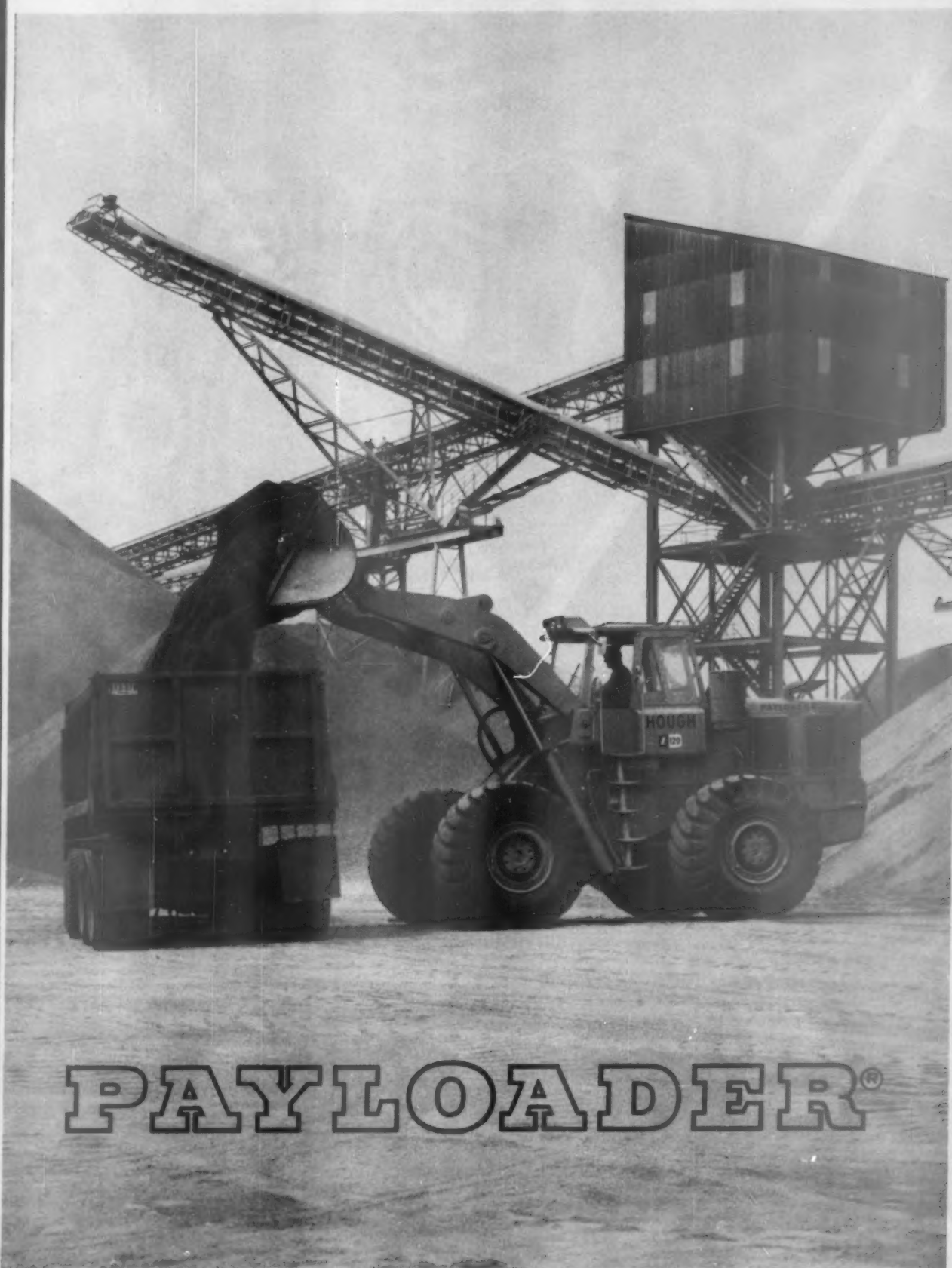
THE FRANK G. HOUGH CO.
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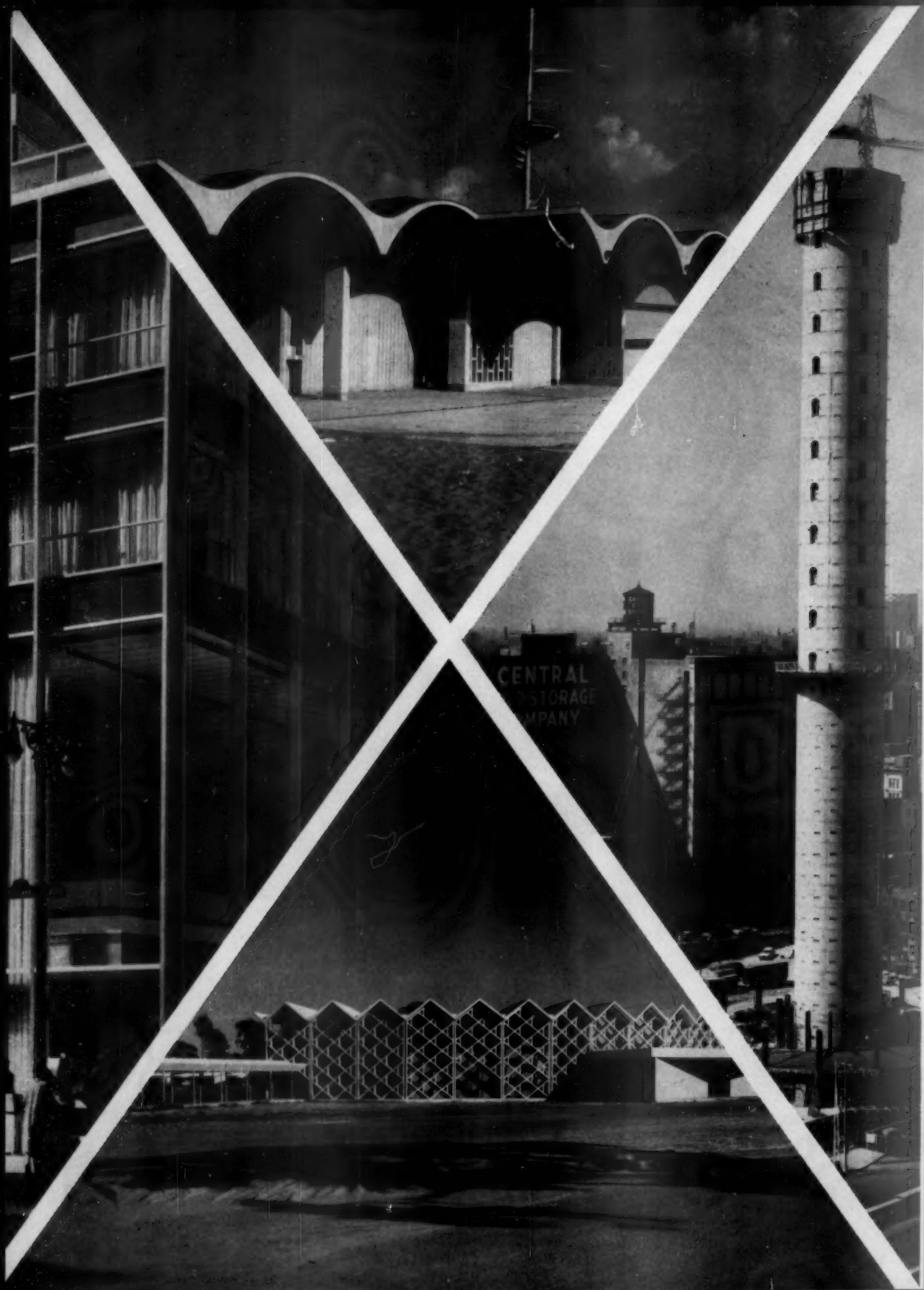


HOUGH, PAYLOADER, PAYDOZER, PAYMOVER, PAYLOGGER, PAYLOMATIC and PAY are registered trademark names of The Frank G. Hough Co.

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PAYLOADER®



Cautious? Optimistic? Exuberant? . . .

What's the mood of the lightweight aggregates industry?

by Enid W. Stearn

1961 STATISTICS—at least for the industry as a whole—seem to look on the bright side. This year lightweight aggregate production is expected to reach 13.1 million tons, and by 1965 it should climb to 20 million. But when the associations representing the various types of lightweights were queried their reactions covered a fairly wide range of attitudes and predictions.

The National Slag Association reports a steady annual production since 1955. However, it has been the failure of the blast furnaces to supply raw material, rather than lack of demand, which has prevented more of a boom. Speaking for the industry as a whole, Managing Director E. W. Bauman claims: "By the year 1965 or soon thereafter, the production of lightweight aggregate in the U.S. will more than double the present output. This would mean for expanded slag alone an annual production of five to six million tons." The Vermiculite Institute predicts that 1961 production will probably equal 1960, despite "soft spots in the con-

Editor's Note: See, also, *Lightweight aggregates come of age*, and *Lightweight aggregates penetrate the block market*, by Kneeland A. Godfrey, Jr., November 1959 & March 1960 *ROCK PRODUCTS*, pp. 83 & 86, respectively

Above: For a thin shell roof, such as that covering these bath houses at Illinois Beach State Park, Zion, lightweight structural concrete has no superior

Left: In this striking building, which houses New York City's Manufacturers Trust Company, lightweight concrete was used for the floor fill

Right: Marina City has started to dominate the Chicago skyline even though not yet completed. These towers will be the tallest concrete frame buildings in the world

Below: Interesting use was made of a lightweight concrete folded plate roof and sun screens in the synagogue of Congregation B'nai Israel, St. Petersburg, Florida

struction industry" and the general slowdown in plaster business. And at the Expanded Clay & Shale Association the general consensus is that by the end of the year business "will start moving toward capacity levels that should carry sales to new heights in 1962." Executive Secretary T. R. Berger warns that competition is becoming increasingly intense, especially in the eastern states. "I cannot recall any period where there was a greater flow of announcements and reports on new or projected lightweight aggregate production . . . Never have so many seemed to be so attracted with an almost missionary sense of zeal and purpose." An equipment manufacturer makes particular note of the influx of cement producers into the field.

Very encouraging is the rise of lightweights in the structural and insulating concrete markets. As they acquire knowledge, adopt the newer techniques such as lift-slab and tilt-up units, and attempt ultra-imaginative roof designs, more and more architects are specifying lightweight concrete. They have already achieved reinforced concrete frame buildings rising 60 stories, and such feats as the 3-in. thick, 186 x 192-ft. hyperbolic-paraboloid roof at Colorado Springs' Broadmoor Hotel. Although most lightweight aggregate except perlite and vermiculite—80 to 85 percent—is still going into concrete block, the Expanded Clay & Shale Association reports that some of its producers are now putting more than 60 percent of their annual production into structural concrete.

Widening its scope never seems to be a problem with this industry. For example, the Perlite Institute lists the following among the new and estab-

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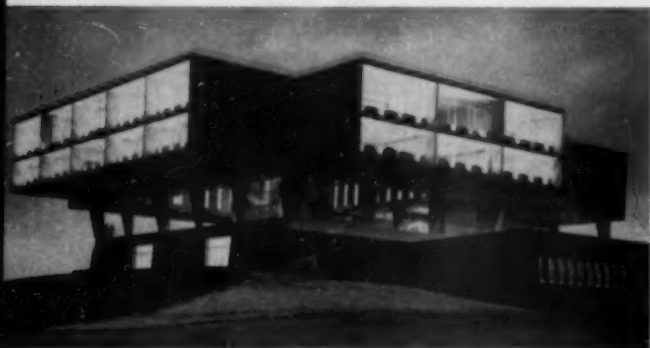
What's the mood? . . .

continued from page 71

lished uses of its product: (a) preventing lost circulation of drilling lubrication fluids in oil well cementing; (b) boiler and foundry mold insulation—also molded insulation block and pipe coverings; (c) acoustical control; (d) abrasives and foundry sands; (e) texture-giving additives to paints and ceramics; (f) mineral filter aids, especially good where a high flow rate is more important than extreme clarity (swimming pools, fruit juice processing, etc.); (g) almost unlimited horticultural uses—rooting, potting, mulching, storing; (h) fire protection through perlite-gypsum plaster; (i) granular fill insulation, roof decks, floor fill; (j) packaging media; (k) in the area of cryogenics (dealing with temperatures below minus 150 deg. C.). According to the Institute's Managing Director, Marve Narramore, a raw material shortage is no hazard, since the known usable deposits are very extensive. Vermiculite thrives in many of the same areas, with the added function of a base for such products as pesticides and chemical fertilizers.

All the lightweight aggregates are versatile, however. Its fire resistance is considered one of the chief selling points of expanded slag concrete. Edward R. Murphy, managing director of the Vermiculite Institute, reports that recently the Federal Housing Administration and the Federal Aviation Agency gave official recognition to water-repellent vermiculite for masonry wall insulation and Type-MK fireproofing, respectively. Four-hour fire wall block made with pumice is being used a great deal in decorative masonry units. These are only a few examples.

One of the finest contributions of the late architect Eero Saarinen, as well as a spectacular use of lightweight structural concrete, is the Milwaukee (Wis.) War Memorial. It is dedicated to the "arts of peace"



An industry bugaboo has been its costly processing methods. They have kept the lightweights high enough in price so that builders are likely to use them only when they are completely convinced that their virtues will offset the higher costs. Here improvements will have to be instigated cooperatively by producers and equipment manufacturers. The latter feel that the industry has at last matured to the point where it is trying to evaluate thoroughly modern plants and techniques, raising typical capacity to 600 to 1,000 tpd. A rotary kiln manufacturer reports much larger installations in lightweight aggregates operations, and a designer of sintering plants mentions large capacity plants underway on the east coast. Another manufacturer comments: "More progressive work has been done in the last 5 years than in the 45 years preceding them . . . It is quite obvious that the rate of progress in the various sections has been purely a function of promotion and education of the architects in any particular area."

Remember—it is highly important that this "education" of architects and builders be just that, not merely an enthusiastic but vague selling job. Too many producers, in their eagerness to "cash in," have known none of the detailed answers and have made little or no attempt to find out. Every time a "don't ask me, I just sell the stuff" attitude crops up, a prejudice is formed against an entire industry.

Research is currently in progress at some of the institutes. From the Expanded Shale Clay & Slate Institute, Daniel P. Jenny writes that they are "head over heels in studies of creep and shrinkage, fire testing, thermal properties, and performance of shear and diagonal tension . . . In many cases work on lightweight concrete has led to engineering data which has improved knowledge and technology pertaining to normal weight concrete." William E. Miller of the Pumice Institute claims research as one of its major goals.

A powerful need still remains for unified and more vigorous research—whether by individuals, groups, foundations or equipment manufacturers. Not only should the processing operations be simplified, but the mysteries still retarding a complete knowledge of the raw materials should be cleared up. When these various physical and chemical reactions are penetrated, and the products standardized to meet the most rigid specifications, the lightweight aggregate industry should have no trouble in overtaking a considerably larger share of the market.

END

Johns-Manville's lightweight aggregate plant is tuned to the demands of a discriminating space-age market

New Mexico mill taps perlite's mother lode

THAT CINDERELLA INDUSTRY, perlite, has seen its production increase over 500 percent in the last 10 years. But the number of uses has expanded too, and can turn into a producer's nightmare unless he is equipped with a versatile processing plant, one that is able to come up with any size material in large quantities.

Johns-Manville's new perlite plant at No Agua, New Mexico, reported to be the world's largest, is without question the most flexible. It produces and blends materials to any specifications with space age precision and push button ease.

The mill and its companion blending and loading installation at Antonito, Colo. meet every requirement. The mill can process nearly 160,000 tons of perlite annually. This amounts to almost three times the entire 1949 national production of 58,100 tons.

Please turn page

Above: The new \$1 million perlite processing mill at Taos, N.M., replaces an older one that was destroyed by fire

Center: Raw perlite ore is ripped and then bulldozed downhill to a truck-loading hopper

Below: Perlite ore passes through one of these two 6 x 50-ft. single shell dryers before it goes further in the processing plant

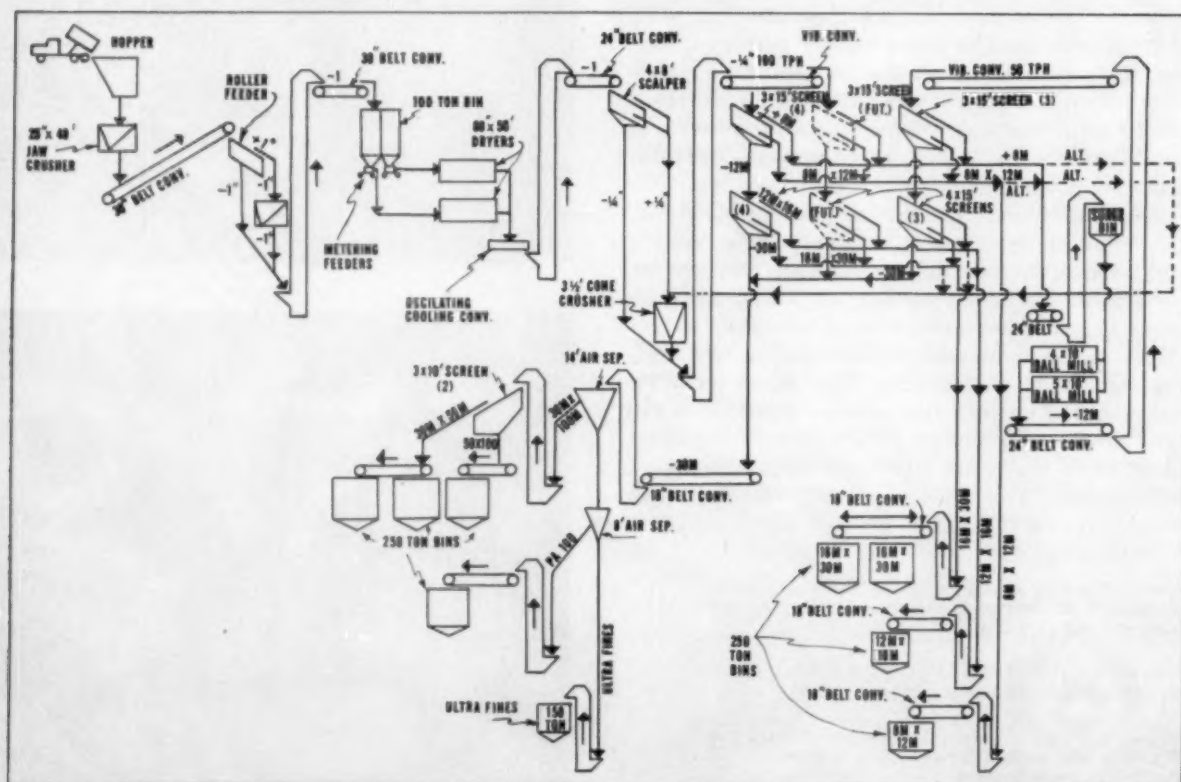




Oversize rock is reduced in a 3½-ft. gyratory crusher after it has been dried to less than 1 percent moisture



Right: A battery of vibrating screens prepares more than nine specifications of sized perlite



Tap perlite's mother lode . . .

continued from page 73

The plant is located in the high desert of New Mexico's Sangre De Cristo range about 100 miles north of Santa Fe and about 20 mi. south of the Colorado line. Adjoining it is the world's largest commercial perlite deposit. J-M acquired 2,000 acres of this deposit when it bought out F. E. Schundler & Co., in 1959. Test holes drilled to several hundred feet confirm reserves equal to more than 100 years' requirements at current production levels. Perlite from the No Agua deposit, in addition to being unusually uniform, has many other desirable characteristics. It "pops" more readily than many other commercial perlites and at temperatures as low as 1,400 deg. F. Most commercial perlites require temperatures of 1,600 deg. F. to expand.

The section of the deposit currently being worked rises about 900 ft. above the processing plant. A dozer removes 5 to 9 ft. of overburden and then rips the pure perlite underneath. The same dozer pushes the loose ore to a truck loading "crib". This bulldozer is the largest unit of its kind currently in production, and carries out the ripping and loading operation at a rate of better than 150 tph.

A plant site stockpile is built to 75,000 tons during the summer to support plant operation during the winter months when heavy snows might close down the quarry. Two 18-ton quarry haul trucks carry the ore, both equipped with torque-retarders for the steep downhill going on the more than 12 percent grade from the quarry. These retarders have proved particularly effective at speeding quarry hauling and reducing truck maintenance costs.

From the stockpile plant feed is dozed into a steel hopper above the 25 x 40-in. primary jaw crusher. Crushed material is carried on a 30-in. belt conveyor to a roller feeder. Plus 1 in. oversize from the feeder drops to a 14 x 24-in. secondary jaw crusher. The crusher product joins fines in the boot of a bucket elevator and ends up in a 100-ton divided storage bin. A pair of constant weight feeders draw material from this bin and transfer it to two 6 x 50-ft. oil-fired rotary dryers. The dryers reduce the surface moisture of the perlite to less than $\frac{1}{2}$ of 1 percent. Dryer discharge is cooled as it travels on a 70-ft. oscillating conveyor.

A scalping screen takes off plus $\frac{1}{4}$ in. oversize and sends it to a 3 $\frac{1}{2}$ -ft. cone crusher. Another bucket elevator delivers both the screen fines and the crusher product to a vibrating conveyor supplying the screening section that follows.

At no point is the plant's versatility and ability to make a variety of products better illustrated than in the screening section. Four banks of double-deck electrically vibrated screens with a total screening surface of 1,470 sq. ft. produce three finished sizes, a coarse fraction which will be further reduced and resized and a fine fraction which will be sized by air separators.

Here's how it works. First step in the sizing operation is a bank of four 3 x 15-ft. double-deck screens. The plus 8 mesh material from the top deck goes to a surge bin supplying the rod mill section. Eight x 12 mesh oversize from the second deck is a finish size, and normally carried to a 250-ton truck loading bin; however, when desired, it can also be fed to the rod mill section. Undersize from the primary screens drops to a bank of four 4 x 15-ft. double-deck screens for further sizing.

Rod mill discharge is re-circulated to a bank of three 3 x 15-ft. double-deck screens. Top and second deck products of these screens are the same as those of the primary screens and follow the same flow pattern. The screen throughs pass to another group of three 4 x 15-ft. double-deck screens. Again the products of these screens are the same as those of the secondary screens and they follow the same flow.

The secondary screens produce two finish sizes: 12 x 16 mesh and 16 x 30 mesh. Both products normally are carried directly to storage. The minus 30 mesh fines are fed to a 14-ft. diam. air separator for sizing into products too small to be handled economically on vibrating screens.

The top deck and second deck products from all screens can be returned to the cone crusher if desired. This, combined with the control possible in the rod mill section, gives operating personnel complete control over the sizes produced. They can shift easily to meet any customer demands for special gradations or to compensate for variations in the gradation of raw materials.

The 30 x 100-mesh coarse product from the air separator is sized on a pair of 3 x 10-ft. single-deck screens to produce two finish sizes: 30 x 50 mesh and 50 x 100 mesh. The fines are treated in an 8-ft. air separator to produce two additional sizes: passing 100 mesh and ultra fines.

In this sparsely settled area air pollution is as yet no problem. An efficient dust collection system keeps the plant virtually dust free. All plant units, from conveyor belts to storage silos, are completely enclosed. Two exhaust fans draw particles from

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IDEALITE GIRDS FOR NEW WESTERN MARKETS



by John H. Bergstrom

*Idealite's
new lightweight aggregate plant
borrows cement-plant
design features
to gain flexibility and
efficiency*

LIGHTWEIGHT AGGREGATES are off and running again. After a brief set-back in 1960, this fastest growing segment of the rock products industry is moving upward again. Of half-a-dozen firms that planned expansion for the years 1961 and '62, Idealite Co. is the first to cross the finish line. Its new \$3.5 million expanded shale plant at Rocky Flats, Col., just north of Denver, can easily claim the title of the most modern and highly automated installation in the industry. The new facility will turn out 1,000 cu. yd. per day of the same rounded, sealed material Idealite has produced at its Laramie, Wyo., plant since 1956.

Design of the new plant dramatically reflects its origin. Patterned after the design standards of the Ideal Cement Co., Idealite's parent concern, it looks very much like a small cement plant. It incorporates many of the design features common in many of the nation's most efficient cement plants while, at the same time, resolving the problems peculiar to shales.

In addition to operating as a highly efficient, high-capacity production unit, the plant will also serve as a full scale laboratory. Several features of the plant are aimed at finding answers to a number of processing problems. The extreme flexibility of alternate flows of material throughout the plant allows wide variation of production techniques under identical conditions.

Capacity of the Rocky Flats plant is currently estimated at 1,000 cu. yd. per day but installation of the second kiln on the basic layout could easily double this figure. An office building in Denver and another in Albuquerque have been designed to use Idealite. Both are the tallest structures ever designed for their respective cities.

With the new plant's output added to the 700 cu. yd. per day capacity at its Laramie plant, the Idealite Co. now has a daily production of 1,700 cu. yd. for distribution throughout a market area stretching from Canada to Mexico, from Salt Lake City to the Missouri River. For all practical purposes, aggregates from the two plants are identical; mixes designed for one can use the other.

Pacesetting features of the new plant include:

1. One bulldozer ripper and one scraper greatly simplifies quarry work.
2. Completely enclosed raw and finished material storage.

3. Pushbutton control of the entire plant from two points.

4. A separate fines crushing section controls the specified amount of minus 100-mesh material.

5. A complete dust collecting system with dust returned to the process.

High-quality reserves of shale are virtually unlimited at the Rocky Flats site. A one-half square mile quarry is being developed about $\frac{1}{4}$ mi. from the plant site. A bulldozer-ripper first rips the soft shale and then push-loads a 20-yd. bowl scraper. This unit hauls the material to the plant, while the dozer returns to its ripping. An ideal balance of ripping time and hauling time makes this a highly efficient operation.

The scraper discharges its load through a grizzly into a 45 cu. yd. steel drive-over-hopper adjoining the five-level crusher building. This building houses all crushing and scaling equipment. A 36-in. wobbler feeder draws shale from the hopper and delivers plus 2 in. shale to double impeller crusher.

All crushed shale, and the material passing the wobbler are combined on a 48-in. belt conveyor. A bucket elevator raises them over 60 ft. to a pair of 7 x 16-ft. double-deck vibrating screens. Feed is split equally between the two screens in parallel. One is designated as the coarse screen and produces three products: 2 x $\frac{3}{4}$ in., $\frac{3}{4}$ x 5/16 in., and minus 5/16 in. The largest fraction is recycled back through the primary crusher while the finest is conveyed to the raw storage section about 500 ft. away. The $\frac{3}{4}$ x 5/16-in. (coarse) material can be treated in one of three ways: It can be recycled through the primary crusher if more fines are desired, conveyed directly to the raw storage section for kiln feed or held in a 1,000-ton capacity storage bin at the crusher building.

The second 7 x 16-ft. screen also produces three sizes: 2 x 5/16 in., 8 mesh x 5/16 in., and minus 8 mesh. The topsize is returned to the primary crusher, the 8 mesh x 5/16 in. fraction is conveyed to raw storage, and the minus 8-mesh material is treated in a special fines crushing section. Electric screen heaters maintain the screening efficiency of both units.

Secondary crushing of the fines is necessary to

maintain the amount of minus 100 mesh material at desired levels. A 30-in. hammermill is used as a secondary crusher, but before crushing, a 4 x 16-ft. gas-fired rotary dryer reduces moisture content of the fines from an initial 12 or 10 percent to less than 5 percent. This effectively eliminates packing in the hammermill and aids in the production of the extremely fine sizes.

Fines from the hammermill are discharged to the same 24-in. belt conveyor that takes other fractions to the raw storage section. The belt now carries a blend of four materials: 5/16 in. x 0 from the coarse screen, 5/16 in. x 8 mesh from the fine screen, 8 mesh x 0 from the hammermill together with all dust from the crusher building dust collectors.

This conveyor (and several others in the crushing section) are unique in that they use a new and basically different type of belt conveyor idler. Each troughing idler is made up of a one-piece steel spring to offer a number of advantages when handling this particular type of material. As the belt is loaded, the idler coil flexes to a parabolic shape, centering the load and making special belt-training idlers unnecessary. The deep troughing of the flexible idlers provides extra belt capacity and greatly reduces spillage. At the same time, the constant flexing of the idlers also makes them completely self cleaning.

All phases of the crushing and primary screening operation incorporate many of the latest refinements of design. All units are completely enclosed and a bag-type dust collector removes all dust generated by the crushing and screening operations. Cyclone-type collectors remove dust from the exhaust gases of the rotary fines dryer.

All raw material handling processes up to the storage tanks are controlled from one central control panel in the small laboratory on the ground floor of the crusher building. All controls are interlocked in sequence and key functions are wired to alarms that notify the operator of situations requiring immediate action. The coarse material storage circuit is typical of the way in which this works. When the coarse storage bin is full, an alarm sounds. An alarm also sounds if the coarse material handling system stops for any reason other than being turned off from the central panel. As a safety precaution, each motor is equipped

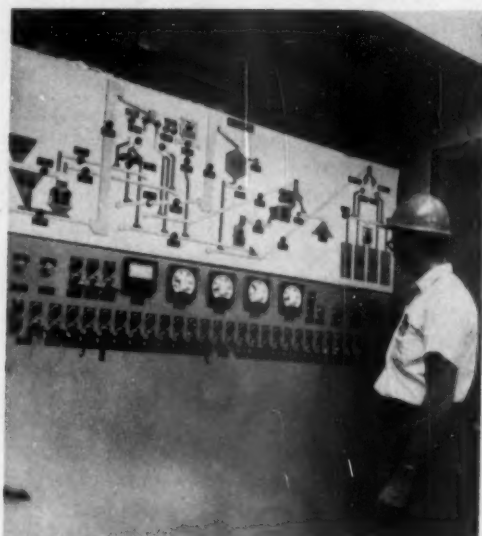
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Left: Raw shale is crushed and dried at the left before it is screened and dropped into one of four steel storage silos

Right: A compact direct-fired drum dryer reduces moisture in the shale from 10 percent to less than 5 percent

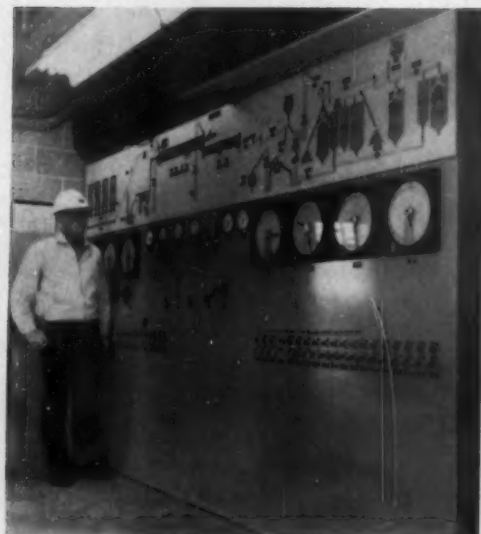
Lower left: Carefully sized shale is fired to spherical pellets in a rotary kiln and these are cooled in a rotary cooler



Upper right: A control panel in the laboratory supervises the flow of raw shales from truck dump to storage silos

Left: Another control panel monitors the actual production of Idealite from the kiln and cooler to storage of finished products

Right: Shipping silos are arranged for high-speed loading into trucks or rail cars



Idealite girds for new markets . . .

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with a switch near the motor itself allowing it to be shut off when maintenance work is in progress.

Quality control starts early in the processing sequence. Samples are taken of coarse, medium and fine materials. Specific gravity, bulk density and moisture are also determined and recorded.

Once crushed, a 24-in. belt conveyor transfers shale from the crusher building to the raw storage section. The belt normally carries 5/16 in. x 0 material flowing through the crushing section, but can also be used to transfer 3/4 x 5/16-in. shale from the coarse material storage silo. When it reaches the raw storage section the shale is split equally between two parallel 7 x 16-ft. single-deck screens with heated decks to eliminate possible blinding. The screens are housed above four 1,000-ton steel storage silos. A reversible belt conveyor distributes the 5/16 in. x 8-mesh oversize to two of the silos; minus 8 mesh fines from both screens drop directly into the other two silos. A bag-type dust collector also serves the raw storage section, returning dust to the fines silos.

Two belt feeders below each silo deposit material on a single collector belt which transfers it to the kiln feed belt. A belt scale in the kiln feed belt controls the speed of the feeders and is itself preset from the kiln firing floor.

At the present time each size of shale is burned separately. But the inherent flexibility of the plant allows separate firing, or combined firing in any ratio of the three raw materials.

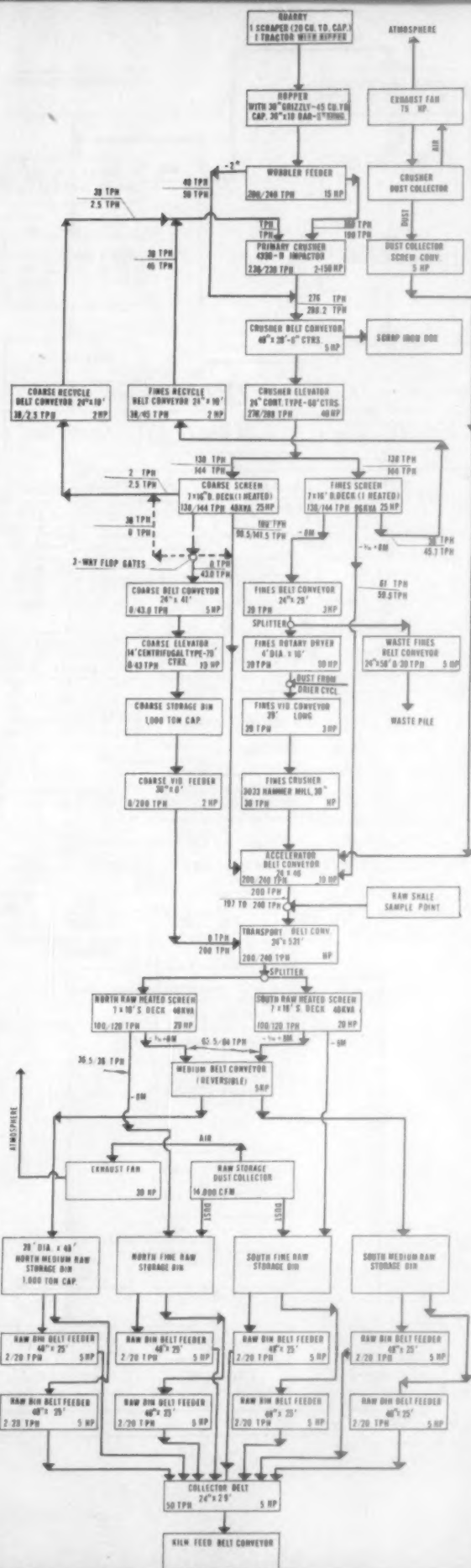
Before firing coarse material, one of the raw silos usually assigned to fine or medium material is emptied and coarse material is transferred from the coarse storage silo in the crusher section. It is drawn from the silo and fired in the same manner as the smaller sizes. Since concrete block, Idealite's principal market, does not use the large size, production of this material is limited to ready mix and concrete construction markets.

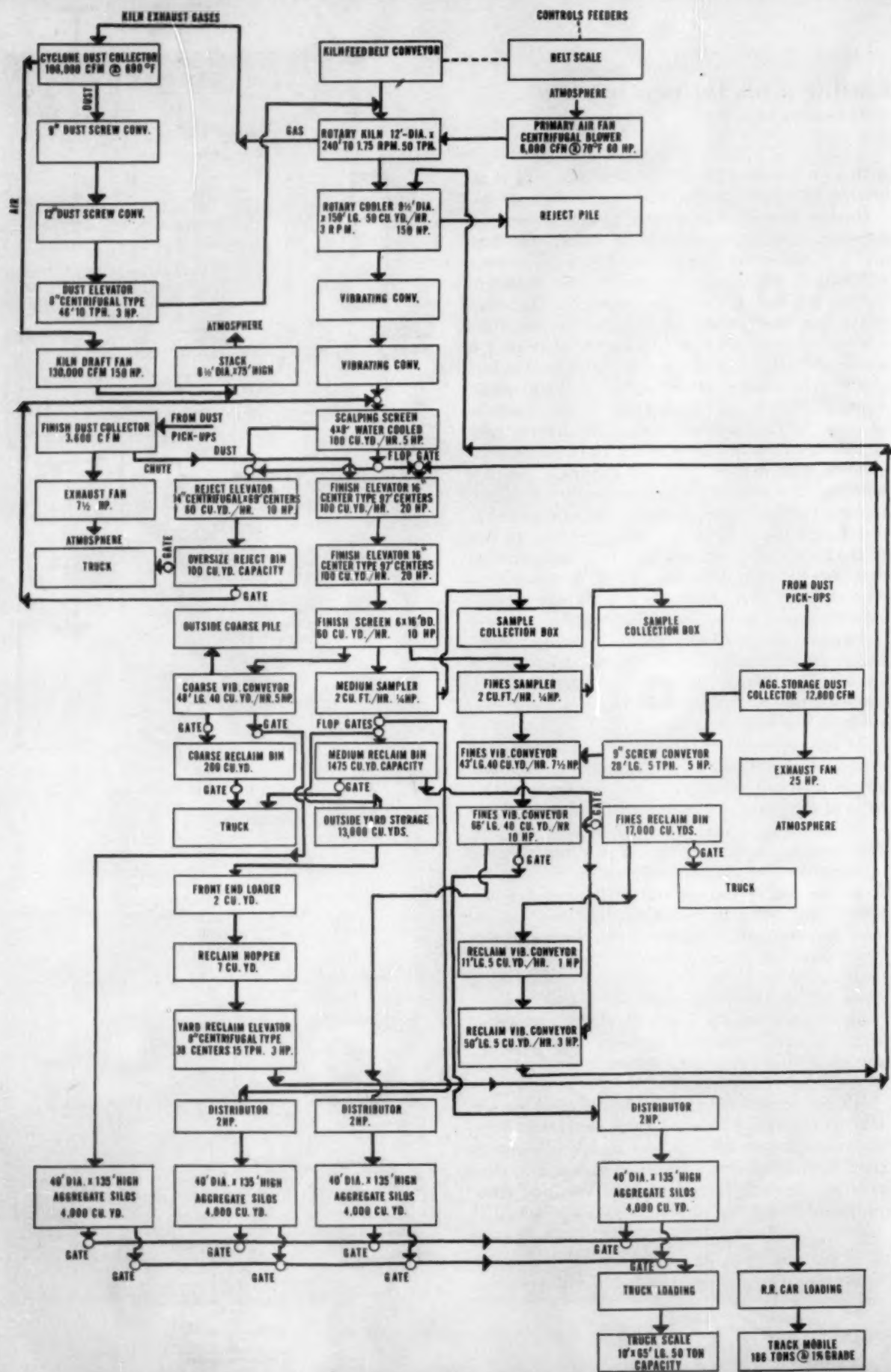
Idealite now uses a single 12 x 240-ft. gas-fired kiln. The unit is operated between 45 and 90 rev. per hr. Firing hood temperature is held as close as possible to 2,000 deg. F.

All kiln operations and the finish screening section are controlled from one panel on the kiln firing floor. All controls are sequence interlocked and include a plugged chute alarm to signal any stoppage in kiln feed. Bulk density of the fired material is checked every 30 min. as an additional qual-

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Right: Shale is processed through a flexible, efficient screening, crushing and drying system





Idealite girds for new markets . . .

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ity control measure. Weights of the finished materials are: coarse, 47 lb. per cu. ft.; medium, 52 lb. per cu. ft., and fines, 67 lb. per cu. ft.

The plant's high degree of centralized control is illustrated by its low labor requirements. The quarry and crusher are operated only 40 hr. a week while burning continues on a 24-hr. basis. During periods when the quarry and crusher are not operating, only four shift men are required to operate the rest of the plant.

Hot exhaust gases from the kiln are passed through a battery of cyclone-type dust collectors with a capacity of 106,000 cfm. and are discharged to the atmosphere through a 75 ft. high stack. Dust retained by the cyclones is returned to the feed end of the kiln.

Now round and expanded, the red hot shale leaving the kiln is cooled in a 9½ x 150-ft. rotary cooler. The cooler is equipped with a trommel screen which removes all plus 3 in. fused material. This oversize is collected in a reject pile and hauled to waste.

Cooler discharge is transferred by oscillating conveyors to a 4 x 8-ft. single-deck scalping screen that removes any plus ¾-in. fused material. The minus ¾-in. aggregates from this screen are elevated to the finish screening section atop the 135 ft. high finish storage silos.

This is done with a pair of 16 in. wide centrifugal discharge elevators whose concrete casings are an integral part of the silo. The discharge of the lower elevator falls into the boot of the upper elevator. This design permits the use of two standard elevators rather than one huge special unit. A 6 x 16-ft. vibrating screen makes three finished sizes: ¾ x 5/16 in., 5/16 in. x 8 mesh and 8 mesh x 0.

A pair of automatic samplers cuts samples of the fine and medium aggregates at the discharge end of the screen. These samples are chuted directly to a laboratory near the base of the storage silos for a series of checks on the physical characteristics of the finished aggregates.

Normal path for all three finish sizes leaving the screen is directly to one of the four 40 x 135-ft. concrete storage silos. Two of these 4,500-cu. yd. capacity silos are allocated to fines storage, with one of each set aside for coarse and medium-size aggregate. In addition to the closed storage silos, a paved outdoor storage area has been provided for

the medium aggregates. Material from the outside storage area is reclaimed by a front-end loader and deposited in a hopper from which it is elevated to the rotary cooler where it joins the regular flow of material.

Reclaim bins have been provided in the interstices of the storage silos for all three sizes of finished aggregate. When producing one size aggregate, any over or under-size material separated by the finish screen drops into these bins. This dispenses with the need to use the regular material handling facilities for this small amount of displaced material. Aggregate contained in these bins can be loaded directly into trucks or returned to the finish screening circuit.

Bulk loading techniques are typical of the designs used in the high speed loading stations in cement plants. Two drive-through truck loading stations, and one rail loading station in the base of the silos provide adequate loading facilities.

Since the new plant is expected to serve a vast marketing area, a great deal of its output will certainly move by rail. Its location on the main line of the Denver & Rio Grande Western Ry will permit fast rail distribution throughout the market.

A large, well equipped maintenance shop and a 2,200-sq. ft. office building round out the plant facilities. The plant itself used a maximum amount of concrete made with Idealite aggregate in all concrete construction except footings or massive slabs where heavyweight material was essential.

END

MAJOR EQUIPMENT REFERENCE

Bulldozer	
Bowl scraper, 20 cu. yd.	
Rotary kiln, 12 x 240 ft.	
Electric motors	
Vibrating screens, 7 x 16 ft., dd, (2)	Allis-Chalmers Mfg. Co.
7 x 16 ft., sd, (2)	
6 x 16 ft., dd,	
4 x 8 ft., sd,	
Wobbler feeder	Hammermills, Inc.
Bucket elevators	Link-Belt Co.
Impact breaker	
Hammermill	Iowa Mfg. Co.
Rotary dryer, 4 x 16 ft.	
Oscillating conveyors (8)	Carrier Conveyor Co.
Vibrating feeder, 3 x 6 ft.	
Screw conveyors	Continental Conveyor & Equip. Co.
Belt feeders, 4 x 25 ft., (8)	Union Supply Co.
Rotary cooler, 9½ x 150 ft.	Stearns-Roger Mfg. Co.
Conveyor idlers (spring)	Hughes-Tyler Mfg. Co.
Conveyor idlers (conventional)	Chain Belt Co.
Conveyor belting	Goodyear Tire & Rubber Co.
Electrical controls	Leeds & Northrop Co.
Dust collector, cyclone-type	Buell Engr. Co.
Dust collector, bag-type, (3)	Northern Blower Co.
Automatic samplers, (2)	Denver Equip. Co.
Belt scale	Trans-Weigh Co.
Truck scale	Fairbanks, Morse & Co.
	Stearns-Roger Mfg. Co.
Design engineering	The Idealite Co.

Left: Spherical lightweight Idealite is fired, screened and stored in this way, ready for shipment

CONTROLS MONITOR GYPSUM KETTLE

*Western Gypsum's first, fully-
automated system
signals breakthrough
for board plant
automation*

by John H. Bergstrom

1—The vital timing controls for the big kettle are housed in a small simple cabinet

2—The kettle mechanism is driven through a big worm gear reducer

3—All material in the kettle is at the boil. The whole operation of putting in raw gypsum and discharging finished material is controlled by sequence timers and a temperature recorder

A FULLY AUTOMATIC gypsum calcining kettle signals a real production breakthrough and a giant step toward the completely automated wallboard plant. This kettle, probably the first of its kind, is in operation at the new Vancouver, B.C., plant of Western Gypsum Products, Ltd. This plant is the forerunner of the next big step forward already on the drawing boards—a gypsum processing plant controlled entirely by an electronic computer.

Key to the completely automatic kettle operation lies in the basic design of the kettle itself and the reliability and precision of its associated operating equipment; for uniform firing, feed and discharge are as essential to the process as the controls themselves.

The natural-gas-fired kettle was developed by Western Gypsum designers in collaboration with engineers from parent company British Plasterboard Holdings, Ltd. Many unusual features include a firebox constructed entirely of plastic fire brick. These have been hammered with a mallet into one monolithic mass until the walls are only about 9 in. thick. This results in a larger furnace volume and better heat transfer in contrast with the usual 2-ft. thick furnace walls.

The kettle itself is also an improvement over conventional designs. Instead of suspending the convex bottom plate from a steel ring fastened to the kettle's sides, the bottom itself is flanged and welded to the side of the kettle. The result is a kettle far less susceptible to overheating.



Kettle operation requires no direct supervision. One man controls all phases of plaster making including grinding, material transfer, tube mill operation and supervision of the dust collecting equipment. He checks the kettle only to be sure that the automatic controls are functioning properly.

The conveyor that feeds the kettle is started and stopped automatically. One of four timers controlling kettle operations starts the conveyor as part of the discharge-fill sequence. When the kettle is fully charged, a high-level sensing device inside turns the conveyor off.

Automatic kettle operation starts with the double-strand drag chain conveyor that draws raw feed from a 100-ton storage bin and carries it to the kettle. Each charge consists of approximately 14-tons of raw material and takes about 45 min. to fill. The feed rate is one of the few operations that is not precisely timed. However, it is carefully adjusted to kettle temperature so that even during the filling process, material in the kettle always remains at the boil.

Primary control instrument is a temperature recorder that functions more accurately than that usually incorporated in other kettles. The thermocouple actuating it is situated at the bottom of the kettle. Here it records the actual temperature of the gypsum boil from the beginning of the fill period, and a safety switch prevents overheating of the bottom in case of feed or other failure.

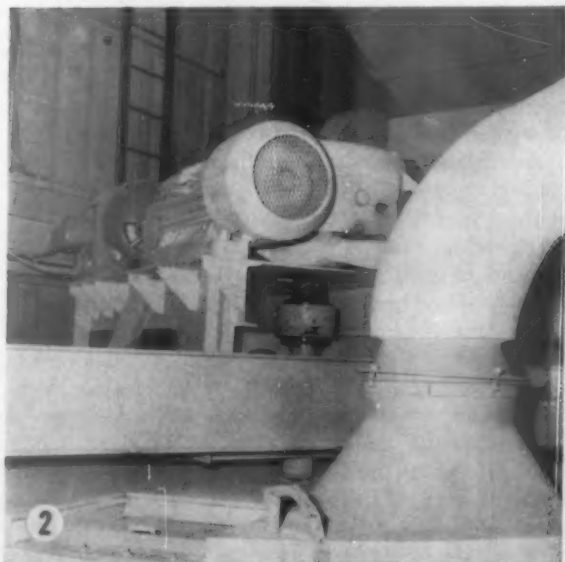
Gypsum calcining is performed on a closely regulated cycle governed by this temperature re-

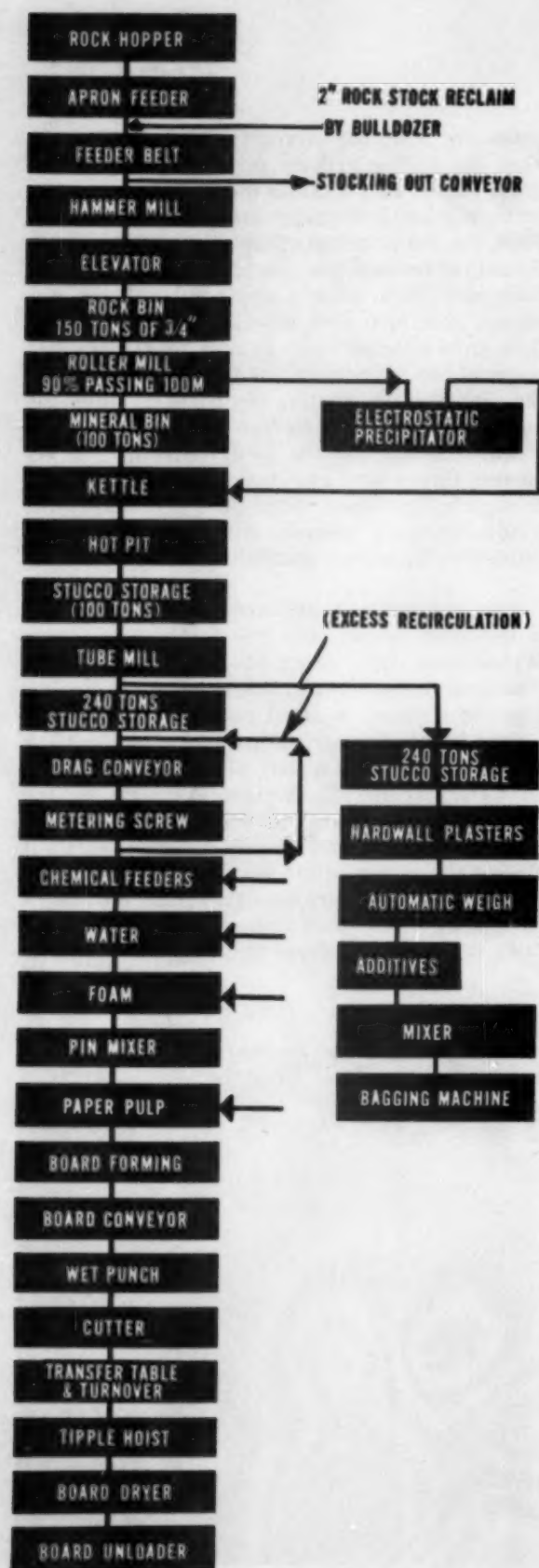
corder and four time recorders. The cycle starts when the boiling gypsum reaches a temperature of 320 deg. F. This actuates the first of four timers controlling kettle discharge and filling in this way: First, the fire is turned off allowing a reduction in the rate of temperature rise of the plaster prior to discharge. Then, after a short interval, the discharge gate and vent pipe damper are opened. Both close automatically as soon as the calcined material has discharged into the hot box. Next in the sequence are starting the conveyor from the hot box to the stucco storage bin, the re-starting of the furnace and the feed conveyor. The sequence timers are automatically ready for the next cycle. The whole operation is performed with a smoothness and precision which would be almost impossible to achieve manually.

Raw gypsum rock destined for the new kettle is delivered by rail from the firm's quarry near Windermere, B.C., about 500 miles to the east. This quarry also supplies Western Gypsum's other plant at Calgary. A small portion of the quarry output is sold for agriculture in Canada and the United States. This quarry also supplies gypsum to Canadian and U. S. cement plants in the western provinces and northwestern states.

The quarry run material is crushed to minus 2 in. at the quarry before going to the board plant. Bottom dump rail cars discharge plant feed into a hopper where an apron feeder draws it off, depositing it on a belt conveyor supplying an intermedi-

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Controls monitor gypsum kettle . . .

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ate storage pile or to a hammermill. Material is reclaimed from this stockpile and delivered to the hammermill where it is reduced to minus 3/4-in. to fines.

This hammermill product is put into a 150-ton steel surge bin for the roller mill. This roller mill product is 90 percent passing 100 mesh. Dust generated in the roller mill is collected by an electrostatic precipitator, the plant's principle dust collector. Pulverized gypsum is stored in a 100-ton bin supplying the single calcining kettle described above.

After calcining, the hot stucco is conveyed from the hot pit below the kettle to another 100-ton storage bin, feed for a 5 x 20-ft. tube mill. Re-grinding in the tube mill produces a "fattier" plaster with greater workability. Apparently this is accomplished by altering the particle shape more than reducing its size. Specific surface of the material entering the mill is approximately 5,000 sq. cm. per gram. After treatment in the tube mill, stucco to be sold as a bagged product has a specific surface of approximately 11,000 scg. Specific surface of material intended for wallboard manufacture averages about 7,000 scg.

Plaster is manufactured in one modern building, while board manufacturing is carried out in a second building; a third building provides warehouse, machine shop and office facilities.

Great care has been taken to eliminate dust, and even the grinding section of the operation is dust free. A screw conveyor burrowing beneath the street and a railway transfers stucco from the plaster mill to one of four 120-ton storage silos in the wallboard plant. Two silos supply material for board manufacture, and two supply the bag packing machine. Currently, about 75 percent of total plaster production is used to manufacture wallboard for the Vancouver construction market.

A variable speed drag chain conveyor draws plaster from one of the two silos serving the four-spout bagging machine, while the second silo is being filled. The screw conveyor measures the volume of material being withdrawn from the storage silo. This is usually about 25 percent more than is necessary to guarantee a steady head of material above the bagging machine. The excess overflows and is returned to the silo being filled, improving aeration of the stucco in the process. A dust extractor collects spilled material from the spill pit below the packing machine and drops it into the boot of the elevator returning excess material to storage.

A drag conveyor draws stucco from the two

storage silos serving the board line and delivers it through a system of screw conveyors to the wet mixer. These conveyors also carry excess material which is returned to storage silos in the same manner as that from the packing machine.

The wet mixer is a disc-type unit developed in England that offers several advantages over the more common pin-type mixers. Without mixing pins there is a greatly reduced tendency to block.

The board line is 400 ft. long from mixing head to cutter. At the head end it is elevated 12 ft. to provide storage for paper, paper pulp and other additives in an easily accessible yet out of the way area. The board line is controlled automatically and produces wallboard of uniformly high quality.

A lath punch is installed along the board line just ahead of the cutter. This wet punching eliminates the dust that would be formed in the gypsum core if punching is done when the board is dry.

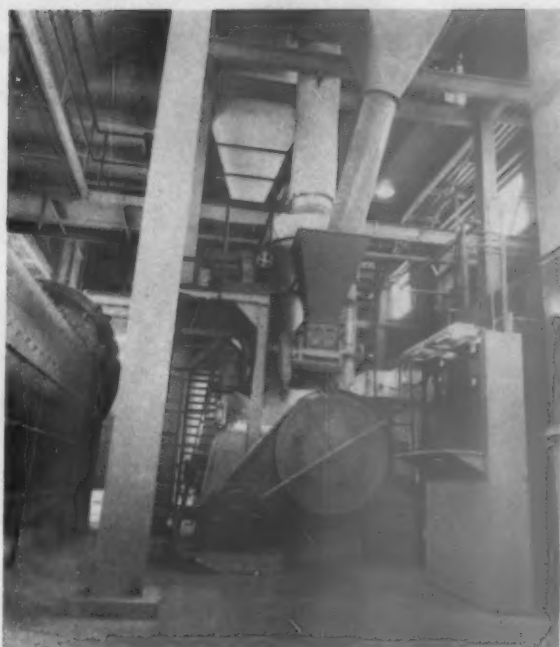
Drying and final processing are also completely automatic and built to Western Gypsum designs. After cutting, the board moves to the transfer table where it is turned face up by a board turn-over and is transferred to a tippie hoist which loads the 6 decks of the 160-ft. dryer. The dryer is heated by natural gas through 2 burners each producing about 10 million Btu. per hr.

The speed of the dryer is precisely synchronized with the speed of the board line, and the temperature is automatically regulated to suit the particular board being manufactured. At the cool end of the dryer the edges of the boards are machine ground and the boards are taped in pairs face to face.

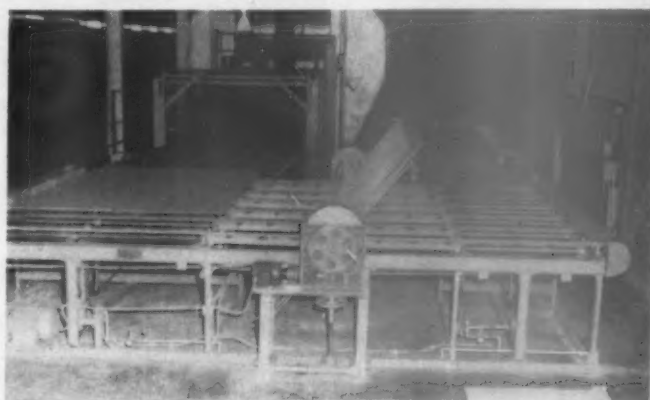
END

MAJOR EQUIPMENT REFERENCE

Hammermill	Pennsylvania Crusher Div.
Apron feeder	
Bucket elevators	} Link-Belt, Ltd.
Belt conveyors	
Conveyor belting	Goodyear Rubber Co.
Roller mill	Raymond Div., Combustion Engr. Inc.
Calcining kettle	{ Design—Western Gypsum Products, Ltd. Fabrication—Dominion Bridge, Ltd.
Tube mill, 5 x 20-ft.	Mine & Smelter Supply Co.
Electrostatic precipitator	Precipitation Co. of Canada, Ltd.
Electric motors	Canadian Westinghouse, Ltd.
Electric controls	Foxboro Mfg. Co.
Mixer, (dry)	} J. B. Ersam & Sons Mfg. Co.
Forming rolls	
Lath punch	
Board cutter	
Automatic weigh hopper	W. T. Avery, Ltd.
Four-tube bag packer	St. Regis Paper Co.
Mixer, disc-type	British Plasterboard Holdings Co., Ltd.
Transfer table	} Design—Western Gypsum Products, Ltd. Fabrication—Canadian Car Co., Ltd.
Inverter	
Tippie hoist	
Board take off	
Board dryer	Coe Mfg. Co.
Design	Western Gypsum Products, Ltd.
Construction	John Laing & Son (Canada), Ltd.



The roller mill (right) and its controls prepare the raw gypsum for the automatically operated kettle



Western Gypsum's board line was designed by its own staff to include features developed from their operating experience



Plaster is bagged in a 4-spout high-speed machine

*Automatic batching, pozzolans and leaner mixes
characterize the concrete dams erected
during the early 1940's*

Aggregates production at dams, Part 4

World War II dams set new trends

by Walter B. Lenhart

THE PACE OF DAM BUILDING scarcely slackened during the war years 1940 to 1945. Among the U. S. Army Corps of Engineers, the Tennessee Valley Authority, cities and private utilities at least 136 dams were completed according to T. W. Mermel in his "Registry of Dams in the U. S."

The Central Valley Project in California was also in full swing, with Friant Dam—on the San Joaquin River near Fresno—an important unit. The dam was built by the Bureau of Reclamation between 1939 and 1942. With it, designers relaxed from the high standards set by Boulder, Grand Coulee and Shasta Dams. They returned to older practices whereby a pozzolan was used—however,

with an important difference. In the older dams, such as the Gibson built in 1926 through 1929, 1 to 3 percent diatomaceous earth was used. Cement content was not cut but held at 4.12 bags per cu. yd. At Friant a locally produced pumicite was used, and the cement reduced to as low as 2.9 bags for the mass concrete and to between 3.10 and 3.87 for the structural and other types of concrete. However, the dam was not very high, having a structural height of 319 ft. One authoritative source gives the base thickness at 267 ft.; another gives it as 487 ft. "which includes the apron."

There were 2,135,000 cu. yd. of concrete with a top size aggregate of 8 in. Sand and gravel for the dam was produced locally. Water-cement ratio was .72 and the slump at mixer about 2 in. About 20 to 25 percent pumicite was used, except on spill-

Please turn to page 88

*See, also, Part 1: *New techniques born on early jobs*, Part 2: "Modern" processes pass test at Hoover Dam, and Part 3: *Aggregate, power records sent tumbling at Grand Coulee Dam*, July, August & October 1961 ROCK PRODUCTS, pp. 88, 102 & 94, respectively

Friant Dam, a key unit in the Central Valley Project, was built during 1939-1942

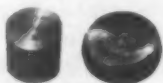


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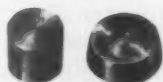


Worn parts are sometimes rebuilt with mild steel followed with an overlay of hard-facing. This procedure is like trying to support a thin glass plate on a sponge. *Poor compressive strength in the supporting base causes cracking and spalling of the surface alloy.* To insure a proper base use **STOODY BUILD-UP**... *it does a job mild steel can't approach!*

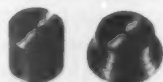
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Aggregates production at dams . . .

continued from page 86



Fontana Dam in the Smoky Mountains used crushed quartzite as aggregates

way faces. This material was dug from a pit that is now under water and was about 95 percent minus 325 mesh. The balance was made up of pebbles of pumice.

It is interesting to note that pumicite cost \$2.54 per ton and portland cement \$8.20 f.o.b. damsite. At Hungry Horse Dam portland cement cost \$24.65 per ton f.o.b. railhead, while pozzolan ran \$18 per ton.

Inspection of the dam by experts in 1942 reported horizontal cracks at the 5-ft. lift joints on downstream face of the dam. Another deviation from better practices as previously established was to cool the concrete by use of ice chips instead of cooling pipes imbedded in the green concrete.

The 600-tph. aggregate plant was built near the pit, about 3 miles downstream from the dam. Some 3 miles of belt conveyors were used in the field and plant, but delivery of finished sand and gravel to the dam was over a standard gauge railroad. All the sand flowed to screen-riffles to recover gold and at times as much as \$20,000 per month was said to have been recovered. Two banks of two sand spirals each operating in series produced the two sizes of sand. The spirals were 48 in., fed from a hydroseparator that got rid of silt. Constant weight feeders proportioned the two sands at the blend.

The gold recovery plant had screen-riffles which

were cleaned from time to time and the heavies re-concentrated in a 24-in. jig. The hutch product went to an amalgamation barrel, and a gold sponge was eventually recovered by retorting the amalgam. Tails from the 24-in. jig were retreated in a 12-in. jig. The gold plant was in a separate building and quite complete. One gold clean-up was "highgraded" and about \$3,000 lost. This is probably the most spectacular "first" at Friant Dam.

About 1949 a Bureau of Reclamation engineer showed me around the dam. He stressed the fact that repairs to the concrete had been excessive. I could not pin him down on an exact figure, but he said it was between \$500,000 and \$1 million up to that time. This resulted from far more than the savings by the use of a lean mix. The portland cement industry was the loser and no one came out ahead in the game.

All four of the dams mentioned in this review were built by groups of contractors who pooled their experience and resources in a job too big for a single contractor. It is noteworthy that on every job one member of the group was a commercial producer of sand and gravel at a permanent location. Production of the aggregate and portland cement for any dam constitutes a major factor in the construction picture. On the big jobs the commercial producer member of the combine usually builds the aggregate production facilities.

On smaller dams aggregates are often purchased direct from an established producer, who may even build a special plant. Such was the case of two nearby TVA dams in the east; Ocoee No. 3 near Ducktown, Tenn., and Apalachia near Fener, N. C. Both were gravity concrete dams completed in 1943. The two dams have a novel distinction insofar as aggregate source was concerned. One plant near Calhoun, Tenn., was built and operated by the Birmingham Slag Co., who supplied aggregates for both dams. Both are relatively small dams; the former is 110 ft. high, with a crest length of 420 ft. and 164,500 cu. yd. of concrete; the latter is 150 ft. high, with crest length of 1,308 ft. and has 237,800 cu. yd. of concrete.

In contrast with western practice, where shovels or draglines do the primary digging, the plant for this job used a 16-in. dredge pump and delivered gravel to barges that were then towed to the plant. The plant and dredge were all diesel driven and had a capacity of 400 tph. to produce the 1 million ton of sand and gravel needed in the dams. Three sizes of gravel and one of sand was produced: Sand was minus 3/16 in. and top size of the gravel was 5 in.

Please turn to page 90

the new

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Aggregates production at dams . . .

continued from page 88

Barges were unloaded by clamshell cranes that served a hopper. Crushing was done with two jaw crushers, units of 20 x 36-in. and 20 x 24-in. Sand was recovered and de-watered in two 10-ft. diam. sand tanks.

Dam building of such scope meant that aggregate production became an important phase of each project. During the 1930's and early 1940's dam construction was not confined to the west for the east was building its share. As an illustration, Fontana Dam was a Tennessee Valley Authority project completed in 1945. This was the 16th dam to be built by this organization up to that time, and it has the distinction of being the highest concrete gravity dam east of the Mississippi River. It is 465 ft. high and 377 ft. thick at the base, to give it a base-height ratio of .81—slightly less than Grand Coulee or Shasta dams. Altogether it involved 3 million cu. yd. of concrete. The main non-overflow portion of the dam was 1,775 ft. long, with a total length of 2,365 ft.

The Tennessee Valley Authority now owns 26 dams in the Tennessee Valley, 5 of which were acquired after they were built by others. The TVA system includes six more dams owned by the Aluminum Co. of America, six dams on the Cumberland River and a new dam under construction— their twenty-first project.

Fontana Dam is TVA's fourth largest power producer, being outranked by Wilson, Wheeler and Pickwick Landing Dams. As opposed to western practice, where sand and gravel is the main aggregate, Fontana used a crushed quartzite averaging 80 percent silica, that was processed dry near the damsite.

I described the 800-tph. crushed stone plant in considerable detail in the September 1943 issue of *ROCK PRODUCTS*. The memory of the elaborate concrete mixing plant still lingers, for it was a completely automatic plant involving five 4-cu. yd. mixers mounted in a circle. One revolving spout from the weigh-batcher above served all five mixers. One push button started the cycle of aggregate, cement, and water weighing, dumping to a mixer and mixing 2.15 min., after which the cycle automatically started on batch No. 2. Recording instruments were prominent. It was said to be the last word in efficiency.

About six years later I visited Davis Dam, then under construction on the Colorado River below Boulder Dam. The Fontana mixing plant had been moved out to do that job. We asked about the one-button set-up, but were told that the automatic features had been split up into five separate units.

They explained that with the older system the electrical wiring was so complex that if trouble developed it took a day or more to locate it. By splitting the automation into five segments, trouble could be isolated and more easily located. Experience is a valuable teacher.

The top size aggregate at Fontana was 6 in., with four sizes of coarse aggregate and one sand. This sand was made by two 9 x 12-ft. rod mills, each with an 800-hp. motor, that received a minus ¾-in. feed from rock prepared by two short-head reduction crushers. Primary crushing was done with two 42-in. gyrators and two 4½-ft. cones. The rod mills operated wet with sand classification by a 16-ft. hydroseparator followed by two rake classifiers. In the article previously mentioned, screen sizes of feed to rod mill, discharge and finished sand are given, along with some data on rod and liner wear. The rod mills operated in open circuit with the hydraulic equipment.

The aggregates preparation plant involved the use of belt conveyors to an exceptional degree for that day and included two suspension bridges across the Little Tennessee River. There were 36 separate belt conveyor units up to 42 in. wide, involving about 2 miles of conveyors.

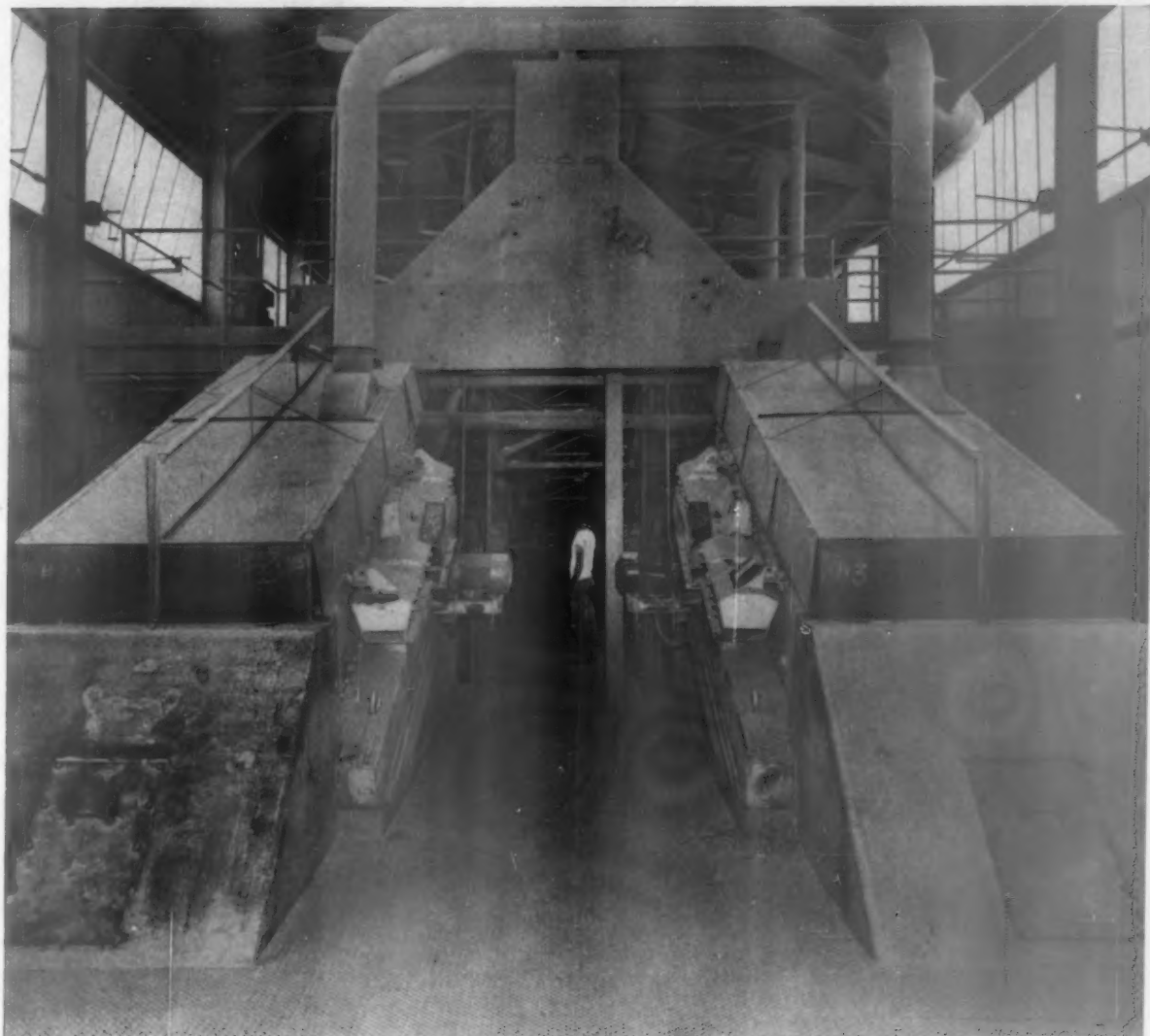
Another novel feature at Fontana was the use of a 42-in. wide belt conveyor to deliver the freshly mixed concrete. This 215-fpm. belt was mounted at a slope of 13 deg. 9 min., and the concrete did not run back on the belt. This belt delivered to other belts serving hoppers. Cranes with conventional buckets did the placing from the hopper.

The quartzite concrete had these characteristics:

Class of Concrete	Water-cement ratio	Cement; sacks per cu. yd.	1-year strength
6-in. mass	.75	3.2	4,060
6-in. mass	.71	3.4	4,730
6-in. mass	.65	3.6	4,990
3-in. mass	.75	3.8	4,650
1½-in. mass	.71	5.0	4,490
3-in. mass	.56	5.0	5,900

The arithmetical average of the cement used comes to about a four-bag mix.

Crushed stone usually takes ½ sack per cu. yd. more than sand and gravel to get equivalent strengths. So there was a slight cut in the amount of cement used at Fontana compared to Boulder, Shasta and Grand Coulee Dams. When the designers cut the base-height ratio from .90 to .81 they lopped off about 300,000 cu. yd. of concrete and the portland cement industry lost at least one million sacks of cement.



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How to keep your conveyors rolling all winter



by J. F. Elwood*

SUB-FREEZING TEMPERATURES will barely faze your belt conveyors this winter—that is, if you follow a few basic precautions.

If the annual sleet and snowfall in your area is exceptionally heavy the best procedure, of course, is to install belt covers or housed galleries. If conveyors are not covered, belt retainers are a wise investment, since they will prevent high winds from turning the belt over—or even blowing it off the conveyor! Heavy snow should always be removed before attempting to start an uncovered conveyor, although very light snow can be removed by running the belt until the snow has gone over the head pulley, provided that it is not harmful to the material.

Belt slippage on the drive pulley is the most common reason why conveyors will not start on cold winter mornings. Since this can be caused by a variety of factors—or a combination of several—the only way to start the conveyor is to discover the cause and remedy it.

Slack side belt tension is the first thing that should be checked. A simple test is to add more

weight to a gravity-type takeup or increase the tension on a screw takeup. Tension should be returned to normal once the belting has warmed up, as too much tension can be injurious to the belt.

If increased tension does not start the belt, check to be sure that the drive pulley and underside of the belt are not glazed with ice. If they are, the glaze can be eliminated by running the belt empty for a few minutes or by sprinkling calcium chloride on the face of the tail pulley. Chemicals should be used cautiously, however, since many types can be injurious to the steel in pulleys and idler rolls.

Although the belt will usually operate if only a few idlers are frozen, there is generally insufficient power to pull the belt over a number of frozen idlers, especially when the belt is loaded. Here, unfortunately, the only really safe procedure is to let the sun thaw them out. Attempts to free them mechanically may damage bearings and seals. Whatever you do, avoid reaching for that blowtorch!

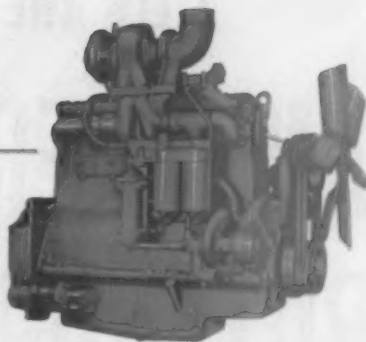
Even with lagged pulleys, water will often act

Please turn to page 117

*Staff Engineer, Barber-Greene Co., Aurora, Ill.

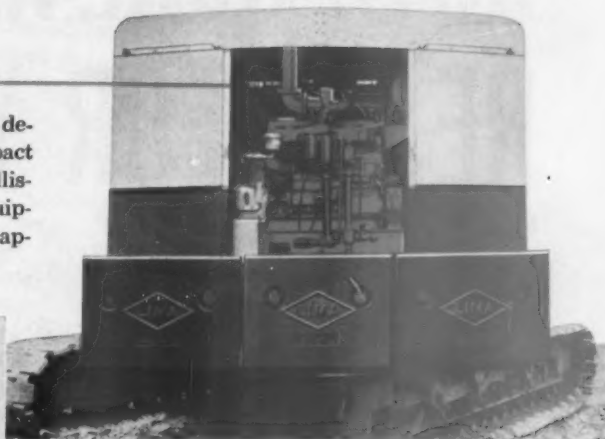
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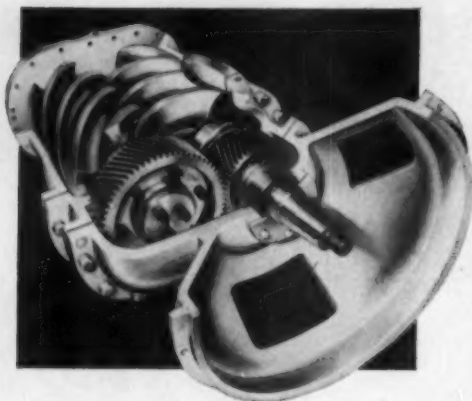
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Part 3*

Semi-automatic welding improves hardfacing techniques

IN THE LAST 10 YEARS, the semi-automatic welder for rebuilding and hard-facing has been a development of prime importance. This simple machine requires no special training for operation, and can cut welding time by one-half or more. Prices range from \$300 to \$700 depending on the use for which the machine is intended, its workmanship and other refinements.

The semi-automatic is essentially only a means of feeding a continuous welding wire to the arc; it eliminates the need for frequent electrode changes, produces uniform weld beads and, most important of all, reduces welding time to one-third or one-half that required for conventional manual methods. It is primarily a substitute for hand welding in the application of various alloy materials to worn parts.

Ordinarily the process uses bare wires as elec-
Please turn to page 98

*See, also, Parts 1 & 2, September & October 1961 ROCK PRODUCTS magazine, pp. 104 & 97, respectively

Above: Automatic welding is available for crusher rolls without removing them from their shafts or housings

Center: The new equipment does not replace the welder—a man must still supervise the job

Below: The heart of the device is a motorized welding head suspended from a carriage rail



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Semi-automatic welding . . .

continued from page 96

trodes and its primary function is in building up and hard-facing with those alloys which require no flux covering. To meet these needs, many manufacturers now produce a wide variety of $\frac{1}{8}$ in. and $\frac{3}{16}$ in. diam. wires, containing granular alloys of different analyses to supply specific types of deposits.

Basically, the welder consists of a set of motor-driven feed rolls feeding continuous wire from a reel or tub through a flexible 7 to 10-ft. cable to the hand-held welding nozzle where the arc is struck. The cable also carries the welding current, which is transferred to the wire itself at the nozzle. Amperage and voltage regulators on the machine give precise control of the current. The power source must have sufficient capacity to provide continuous duty cycle; a 400-amp. source is generally recommended.

The work is grounded, the arc is struck and the wire feed is started automatically and stopped when the arc is broken. Any competent welder can operate the machine after only a brief explanation of the various controls. With it he will get far more work done, get more uniform deposits and at the same time will relieve himself of most of the tedious features of hand welding.

The semi-automatic is generally considered only as a more efficient substitute for hand welding. But it is easily adapted to certain types of automatic operation when coupled with a simple rotating positioner to handle cylindrical work for rebuilding and hard-facing. The work on the positioner is turned at any required speed while the welding nozzle, mounted on an adjustable positioner track, is set or moved as necessary in relation to the work. This device is widely used for the maintenance of tractor rollers and idlers, shovel house rolls, shafts and small trunnions.

A recent development that may well prove of major importance to the operator of portable crushers has now reached the market. The maintenance of portable crusher shells has always presented a serious problem wherever the material to be crushed is of a highly abrasive character and production schedules are demanding. Many kinds of rock—traprock, caliche, river rock, for example—will wear shells faster than they can be built up by hand welding; as a result, production of aggregate falls short of requirements. More time may be spent on roll rebuilding than on crushing. The difficulties of manual welding on portable roll crushers are too well known to need comment.

The semi-automatic machine promises to supply

a good answer to this roll maintenance job with a device that will lay down three or four times as much weld metal as is possible by hand—and that will at the same time relieve the welder of his most tedious task. To prepare for the installation of the necessary equipment, the hopper and other top plates on the crusher are cut to expose both rolls for welding; plates may be hinged or bolted in place for easy removal. Permanent vertical steel supports are mounted on the crusher case to carry a light, removable horizontal track over each roll; on this track the traversing carriage with the semi-automatic welding nozzle will cover the entire width of the rolls.

The semi-automatic machine is mounted on a platform so that the cable can be attached to the traversing carriage. Sprockets are fitted to the rolls and connected by chain drive to a variable speed gear head motor, which turns and indexes the rolls for welding.

Once the permanent setup is installed, only a few minutes are required to open up the top plates, place the semi-automatic machine, mount the track and traversing mechanism and hook up the roll-turning device. From that point on the welder stands in the open where he can observe the complete operation. He governs with simple electronic controls the welding pattern and application of the material to take care of any uneven wear. When the rolls have been brought back to proper contour with the build-up wire, the hard-facing wire selected for the final overlay is put on the machine and the job completed.

In addition to the enormous saving in time, this process assures a far more uniform and wear-resistant deposit. The semi-automatic equipment described is supplied as a complete package unit for the roll rebuilding procedure, and first cost appears to be moderate. Where aggregate production presents problems because of excessive roll wear, the price might well be considered very reasonable indeed.

Occasionally reluctance is encountered on the part of "old hands" when it comes to switching from manual to semi-automatic welding. Some, probably expressing a basic fear of automation, tend to regard the machine as a tireless slave driver—allowing no breaks for a cigarette or bottle of pop. In some cases management has been forced to demand that it be used—"or else." The fact is, however, that competent welders welcome these machines, which let them handle more work and extend their value and usefulness to the shop.

END

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Rubber-lined pumps can cut operating costs

by A. F. Ziehm*

FINE MESH ABRASIVE MATERIALS often shorten the life of pumps made of metal because of continual wearing action. Rubber-lined pumps are available and they play an important role in holding repair and replacement costs to a minimum when handling abrasive slurries, such as sand classifier overflows, thickener underflows, flotation circuits and cement-making slurries.

Rubber-lined pumps have definite limitations; they cannot cope with gravels of large size or materials or fluids at high temperatures. But then, metal pumps cannot cope with the washing action of fine mesh material in suspension. Replaceable rubber liners allow on-the-spot repairs and eliminate long maintenance shut downs.

A typical example of reduced handling costs and improved operations through the use of rubber-lined pumps is at Bryan Rock and Sand Co. in North Carolina. The pump replaced a stacker and conveyor previously used to transport 2,000 tons

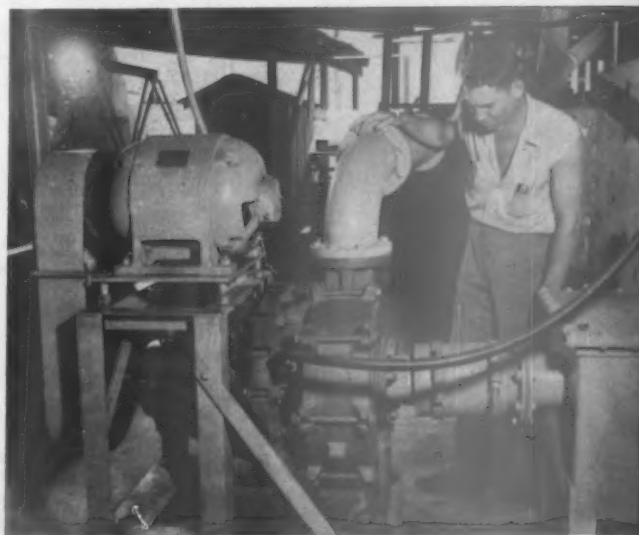
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*Application Engineer, Centrifugal Pump Dept., Norwood (Ohio) Works, Allis-Chalmers Mfg. Co.

Above: Bryan Rock & Sand Co. uses a rubber-lined pump with a 125-hp. motor to pump 2,000 tons of sand a day

Center: This is an ideal arrangement of pump and motor where space is not a limiting factor

Below: Very often, where space is limited, the motor can be placed just above the pump without reducing efficiency



Rubber-lined pumps . . .

continued from page 101

a day of concrete and masonry sand that had been separated from gravel in the washing portion of the plant.

In the present arrangement, sand discharged from the washer is retained as a slurry and is pumped by a 10 x 8-in. rubber-lined pump through a hose to any selected storage area. The continuous use of the pump frees a bulldozer and a front-end loader from the chores of managing stockpiles of wet sand.

Every consideration was given to the hydraulic conditions involved when planning the pump installation and pipeline. Ideal suction conditions were not overlooked because the amount of solids that the pump would handle depended on the correct setting of the pump. The suction line from the tank or source of supply was as short as possible, sloping slightly up to the pump flange. Eccentric fittings were installed so that no air pockets could develop in the suction line, and cause air binding. Then too, if a sump from which the pump takes its suction is too small, excessive turbulence may develop and cause undesirable surging. Driving the pump was a 125-hp. electric motor. A silicone insulation on the open motor eliminated the need for the more costly totally enclosed type of motor usually required for severe duty or outdoor application.

On the basis of 7,000 gpm. operating at a head of 70 ft., 81 percent efficiency, at 675 rpm. this pump has an impeller tip speed of approximately 4,300 fpm. There are other operating points on the pump curve where efficiency is as high.

Occasionally abrasive slurries higher than 160 deg. F. are encountered which include oils, making them very particularly difficult materials to handle. Compounds like Neoprene have been developed to combat such conditions, but they must be selected carefully. Experience indicates that pure gum rubber, pressure-molded on steel skeletons, is best for straight abrasive applications. Often, however, rubber compounds must be changed to meet conditions of erosion and corrosion.

It is hazardous to predict the performance of sand pumps. While suction conditions are very important, it is equally important to figure the discharge head as accurately as possible to prevent the pump from operating too far out on the curve at breakoff conditions.

If space is not a limiting factor, the suggested arrangement is as indicated in the photo. The concrete footing for the motor is sufficiently high to keep from flooding out under normal conditions.

Obviously the unit is exposed to atmospheric temperature changes, so the discharge nozzle has been arranged for bottom horizontal position. This permits putting a plug in the pipe section adjacent to the discharge nozzle for the purpose of draining, to prevent serious damage to the pump in case of freezing temperatures. Note too, that the suction pipe slopes slightly upward to prevent air pockets.

It is often advisable to place a screen in front of the suction to prevent wood or other trash from entering the pump. A pocket below the suction pipe, to collect metal particles, is desirable with a clean-out arrangement.

When handling pulps with reagents that may have foaming characteristics, it is always good practice to admit the pulp to the pump as far away from the pump suction as is feasible. This prevents air from being drawn into the suction of the pump which might create a vortex, cause air binding, and result in unsatisfactory operation.

Often when space is at a premium the pump can be set up with an overhead base where the motor sits over the pump and a sheave arrangement is used as shown in the picture. Here, too, it is possible to use adjustable or vari-pitch sheaves to vary the pump speed and capacity.

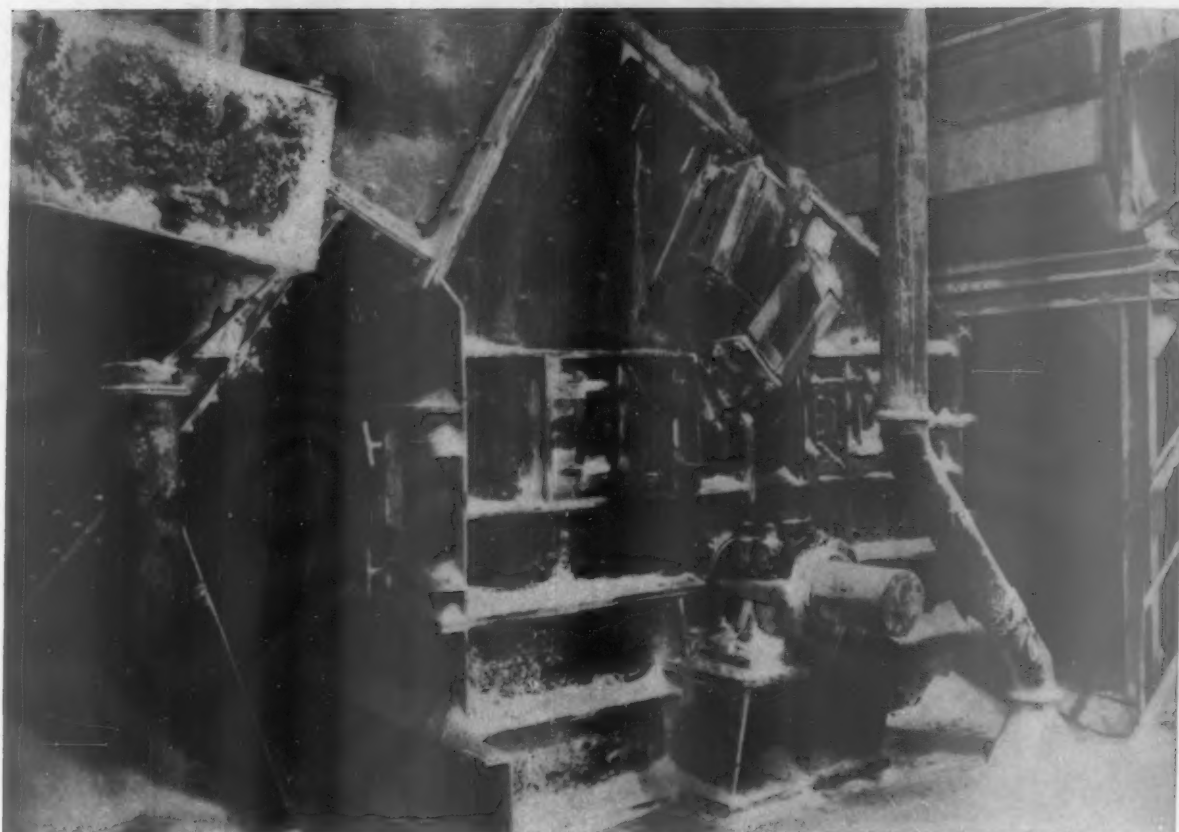
Most slurry pumps are equipped with full diameter impellers with capacity, head and speed changed by the V-belt sheaves. It is possible to arrange a direct drive if the desired capacity and head is achieved at a synchronous speed. The pump and motor then would be directly driven through a flexible coupling.

The discharge nozzle position can be arranged to suit the individual and specific requirements, while the steel baseplate can be furnished plain or with drip-lip to pipe off any leakage coming from the gland. While a coupling can take a certain amount of misalignment, it is always advisable to install the unit on a level floor, shimming if need be, to insure the best possible operation.

This would make it easier to match the suction and discharge pipe flanges to pump flanges, avoiding stresses. Adequate support should be provided for the suction and discharge piping before coupling the piping to the pump flanges, so that pump flanges are not used as supports. Piping installation should always begin away from and progress toward the pump.

The flexible coupling also permits dismantling of pump for repairs without disturbing the driving unit. The coupling guard is the protection against possible injury to maintenance personnel who may be called upon to service the unit.

END



JOY-Hazemag Impact Crushers produce uniform products in limestone operation

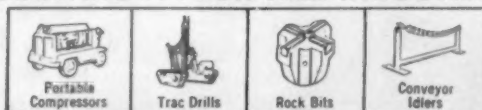
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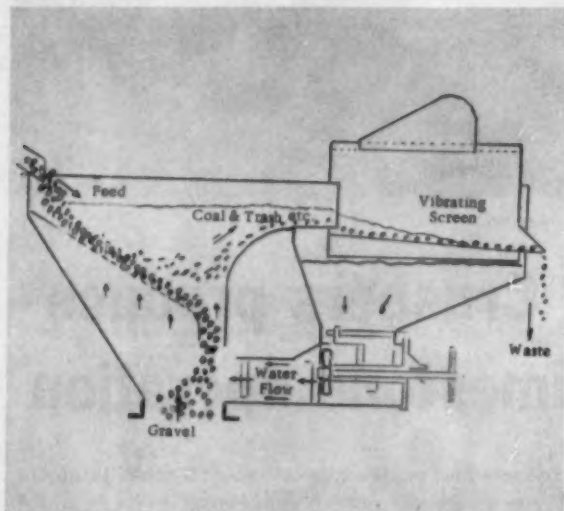
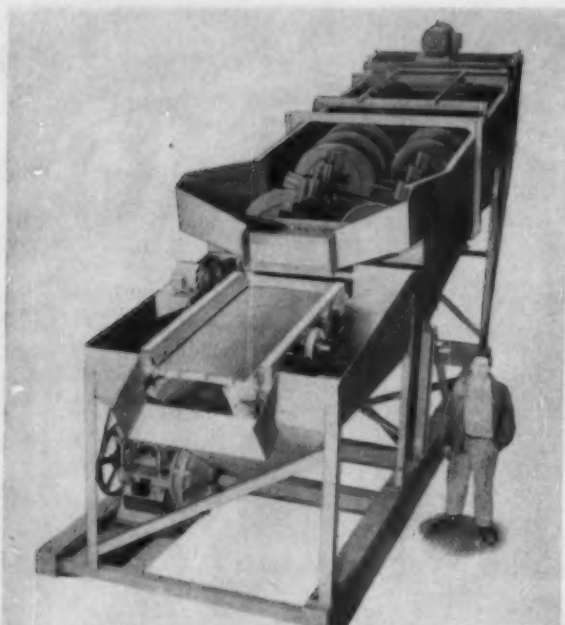


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Aggregates processing tips,

*Part 3**

Beneficiation pays off

by C. E. Golson & D. E. Newton†

ALTHOUGH HAND-PICKING and other rudimentary upgrading techniques have long been used in the aggregate industry, beneficiation processes are comparatively recent. In most metallurgical processes the volume of valuable constituents is small compared to the volume of ore being processed; for aggregates it is the quantity of material to be wasted which is slight.

Because of the inert characteristics of aggregates, only processes which make use of physical properties can be applied to aggregates economically. Hydrometallurgical and physico-chemical processes such as flotation have had no place in the industry so far. Therefore, any discussion of beneficiation processes will be based on the physical properties of aggregates. *Please turn to page 106*

Fig. 20 (above)—A combination screw washer/log washer is a simple, effective method of recovering light and friable deleterious materials from gravels

Fig. 21 (center)—The Belknap washer does an effective job when larger amounts of contaminants must be removed from gravel efficiently

Fig. 22 (below)—Most common HMS system in the sand and gravel industry is the drum vessel

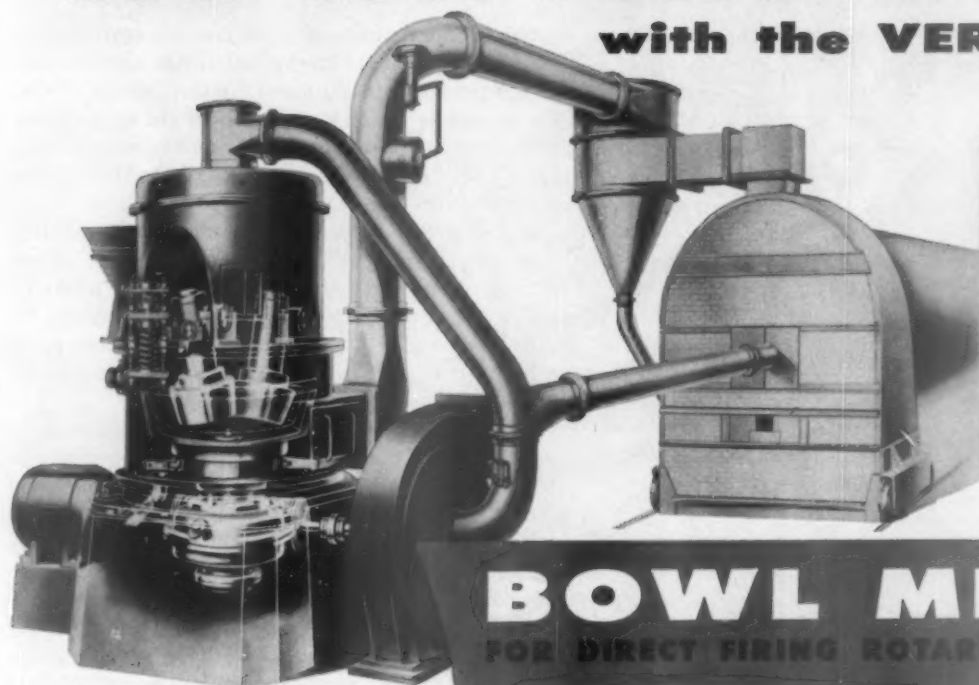
†Mr. Golson is Consulting Engineer and Mr. Newton is Manager, Aggregate-Conveyor Dept., WEMCO Div., Western Machinery Co.

*This is the third and final part of a summary of a paper presented before the Industrial Minerals Div., Society of Mining Engineers of AIME, at St. Louis. See, also, Parts 1 & 2, August & October 1961 issues of *Rock Products* magazine, pp. 87 & 90, respectively

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ROCK PRODUCTS, November, 1961

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Beneficiation pays off . . .

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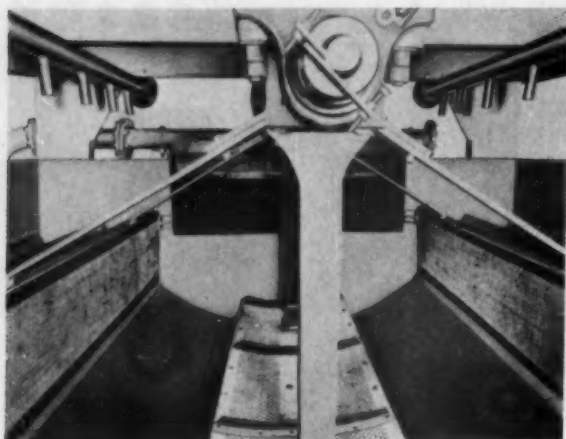


Fig. 23—The OCC separatory vessel is another distinct type of heavy medium system



Fig. 24—A popular method of feeding free-flowing granular materials involves the electromagnetic plate feeder

Resistance to impact or abrasion processes are based on the same principles as selective crushing or grinding. They are used only where differences in physical properties between the desired and the undesired constituents are so small as to preclude the use of any other beneficiation process. There are disadvantages however. Sound fractions are often degraded with the unsound; the high cost of power and supplies tends to make the processes expensive. There is no assurance of the effectiveness of the process. Impact crushers and rod mills are commonly used for this purpose, while sizing equipment is required to separate the degraded unsound fractions from the sound materials.

Specific gravity processes have become an ac-

cepted, economic method of upgrading aggregates. The U. S. Bureau of Reclamation has shown that a large proportion of unsound constituents of the raw materials which are processed for aggregates are lighter in specific gravity than the sound fractions. This difference is used as the basis for the removal of these unwanted fractions.

The removal of organic substances by washing is sometimes referred to as "beneficiation." This is usually carried out in conventional washing equipment, but because of small differences in settling rates, large quantities of water may have to be used which, in turn, may cause the loss of the finer sound fractions.

Washing is also used to remove unsound mineral fractions considerably lighter than the desired ones. It has economic applications where the loss of these fines will not harm the gradation of the processed aggregate, or where the cost of extraction of the raw material is so low that considerable wastage does not make the process uneconomical. One type of machine (Fig. 20) removes deleterious materials of light specific gravity from silt and sand-laden wash water. Several devices adapted from coal washing plants using large volumes of water at high velocity have been used with success in certain areas. A typical one is the Belknap Washer, Fig. 21. (Ohio River Sand Co., *ROCK PRODUCTS* magazine, September 1959, page 125).

Localized attempts to replace the stream of water with one of air have been used where water is scarce. In the semi-arid areas of the Southwest this is done in conjunction with dry-screening. Relatively low efficiency is accepted in many cases as a compromise solution. At one plant in Pennsylvania, a stream of air flows through a falling slurry of sand in water and removes lignite and very lightweight shales. Because differences in specific gravity must be appreciable and the loss of fine fractions is inherent in the system, these methods are limited in their application and acceptance.

The process of jigging is one of the oldest in the metallurgical art. By imparting successive acceleration and settling to mineral particles in a slurry, marked segregation of the light and heavy fractions in the stream can be obtained.

Learned articles have been presented which analyze the action of different types of jigs; but most of these apply to metallic ores where the amount of material to be rejected is many times that of the heavier recoverable metals. In the case of coal, the amount of heavier bone, slate and

Please turn to page 108



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USE: Recommended for priming all NCN products, "TOVEX" gel, and prill/oil mixtures, bulk loaded or cartridge, in holes of 4" diameter and larger.

HDP-2

PROPERTIES: Weight ½ lb. • Detonation Velocity 24,000 fps • Highly resistant to water and oil • Dimensions—3" diameter cylinder 1.4" long • Two axial holes sized for use with "Primacord" only • Packed 100 primers per case—50 lbs. net

USE: Satisfactory for priming bulk loaded NCN products and prill/oil mixtures in holes of 4" diameter and larger.

HDP-3

PROPERTIES: Weight ½ lb. • Detonation Velocity 24,000 fps • Highly resistant to water and oil • Dimensions—1¾" diameter cylinder 3½" long • Single axial hole centered in the primer sized for "Primacord", electric blasting caps and MS delay electric blasting caps • Packed 150 primers per case—50 lbs. net

USE: Recommended for priming all bulk NCN products, "TOVEX" gel, and prill/oil mixtures in holes ranging from 2" to 4" inclusive in diameter.

HDP-5

PROPERTIES: Weight 5 lbs. • Detonation Velocity 24,000 fps • Highly resistant to water and oil • Dimensions—5¼" diameter cylinder 4¼" long • Two axial holes sized for use with "Primacord" only • Packed 12 primers per case—60 lbs. net

USE: Recommended for priming all NCN products, "Tovex" gels and prill/oil mixtures, bulk loaded or cartridge in holes of 6" diameter and larger, under exceptionally severe conditions.

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Beneficiation pays off . . .

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shale is much less than that of the desired clean coal. In any event, the "heavies" are but a fraction of the "lights."

In the treatment of iron ore by jigs, and in the processing of aggregates, the contrary is true. This led to the design of machines with large beds and plenty of hutching capacity for the removal of heavy fines. The difference in specific gravity of iron ores and their gangue is sizeable. But that between sound and unsound fractions of aggregate is much smaller and has led to severe demands on the equipment which have been satisfied only in the last few years.

Since the action in these machines is entirely mechanical, there are limitations to the efficiency of the separation. This depends on the difference in specific gravity, on sizing of material and, finally, on the characteristics of the machine itself. Removal of waste material entrained in the product and recovery of sound material retained in the waste may require costly additional jigging or a compromise in efficiency which must fit within the specifications. In the last four or five years the treatment of minus 4-mesh fine sand by jigging has yielded highly satisfactory results.

Heavy medium separation (HMS) was introduced to the aggregates industry during the last few years of World War II by a mining engineer serving in the RCAF. This process is as old as Archimedes's famous experiment in his bath tub but it was slow in developing. It is based on the fact that a body will sink in a bath of lighter specific gravity and float on a heavier. Only when a controllable, cheap and re-usable medium was found could this process be used economically in industry. The answer was provided by finely ground magnetite and ferro-silicon suspended in water and the density of the bath controlled by varying the amounts of each. These magnetic particles could be recovered with magnetic separators and losses of media were not too costly.

Experiments in the field led to improvements in the mechanism which keeps the media in suspension without excessive agitation and convection currents. Removal of fine fractions of material to be treated, below No. 8 sieve, was necessary because they increase the viscosity of the bath and decrease its specific gravity.

Heavy medium separation (HMS) has become recognized as an important factor in the production of sound aggregates from submarginal deposits. Mechanical improvements have led to separations at as low a difference in specific gravity as .03, with recovery of sound materials in excess of

90 percent. The removal of unsound fractions heavier than the sound material such as ironstones although theoretically possible, has not yet been attempted, probably because there has yet been no pressing need for it.

Several types of HMS vessels have been used in the aggregate industry, according to the difficulty of the problem. These types include the cone, the drum and the OCC separatory vessels (Figs. 22 and 23).

In some areas the modulus of elasticity of unsound fractions is considerably lower than that of the sound aggregates. Some attempts have been made to make use of this property in bouncing the

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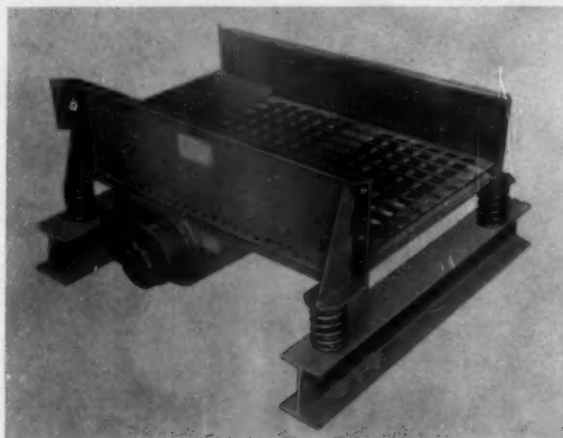


Fig. 25—Mechanical vibrating plate feeders are also well known—this one has a grizzly section



Fig. 26—Radial stackers have greatly enlarged the storage areas available to many rock products producers

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raw material on tool steel plates set at different angles. This process has been practical in only a very limited number of applications.

Aggregates can be processed from blast furnace slags, and the iron which may be present in small amounts in the slag can be removed with magnetic separators. But since the presence of iron in the slag is a sign of poor blast-furnace operation, this form of beneficiation is not too common.

The problem of handling materials in the aggregate industry differs from those in the metallurgical industry in two respects: (1) large tonnages that are handled—one handling 1,000 tph. through a single system is not uncommon. (2) the

comparatively low value of the material; this imposes a minimum of man-power for these large volumes. Indeed, much of the technology developed by the rock products industry is beginning to influence modern metallurgical plant design in its search for efficient low-cost operation.

With its particular problems arising from these two factors, the aggregates industry has established certain rules and customs:

- Bins or hoppers for the storage of materials must have bottoms and gates designed so that there is a minimum of dead storage without size-segregation within the bin.
- Where stockpiles are used, the fall between the conveying system and the stockpile should be minimized to prevent degradation of the material as it drops.
- Rilling of material along the slopes of a stockpile must be minimized to prevent possible size-segregation.
- Use of heavy equipment on top of a stockpile to spread the material is frowned upon, as the weight of this equipment may lead to degradation of the material.
- Pumping of sands to a stockpile leads to size-segregation.
- Reclamation from stockpiles must be designed to prevent rilling.
- Bulk loading from stockpiles to trucks or railroad cars may be done for individual size ranges, but the material should be finish-screened before blending or using in concrete to remove fines formed by degradation or weathering.
- Blending requires some form of mixing other than just loading a quantity of different size ranges into a truck or car.

Feeders in this industry are needed to obtain maximum efficiency from the processing equipment, to control the proportions of finished products reclaimed and to supply the blending or mixing systems. In addition, proper design of feeders reduces man-power requirements to prevent hang-ups in gates, chutes and crushers.

Apron feeders are very common to handle the coarse materials. Because of the large dimensions and capacities required, these machines are heavy and costly. A modification of this type feeder is the belt-feeder used to regulate the amount of fine and intermediate aggregates, mostly in the reclaiming system. In the design of these feeders, as in all others, a prime consideration is that they absorb or reduce the shock load on the conveyor belts from material dropping directly from the gate onto the belt.

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Fig. 27—The fixed stacker has a wide following in the industry and quite a few can be adjusted vertically

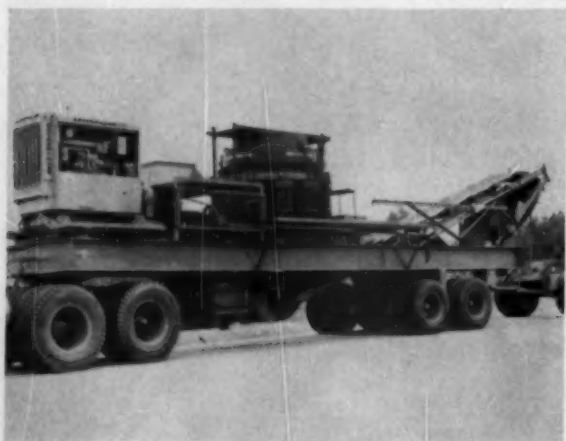


Fig. 28—Huge crushers are available on fully portable, roadable rigs like this gyratory with its own prime mover

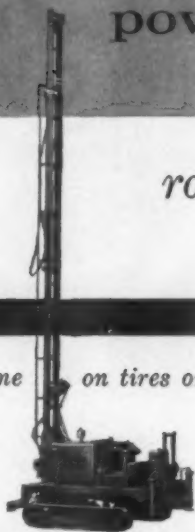
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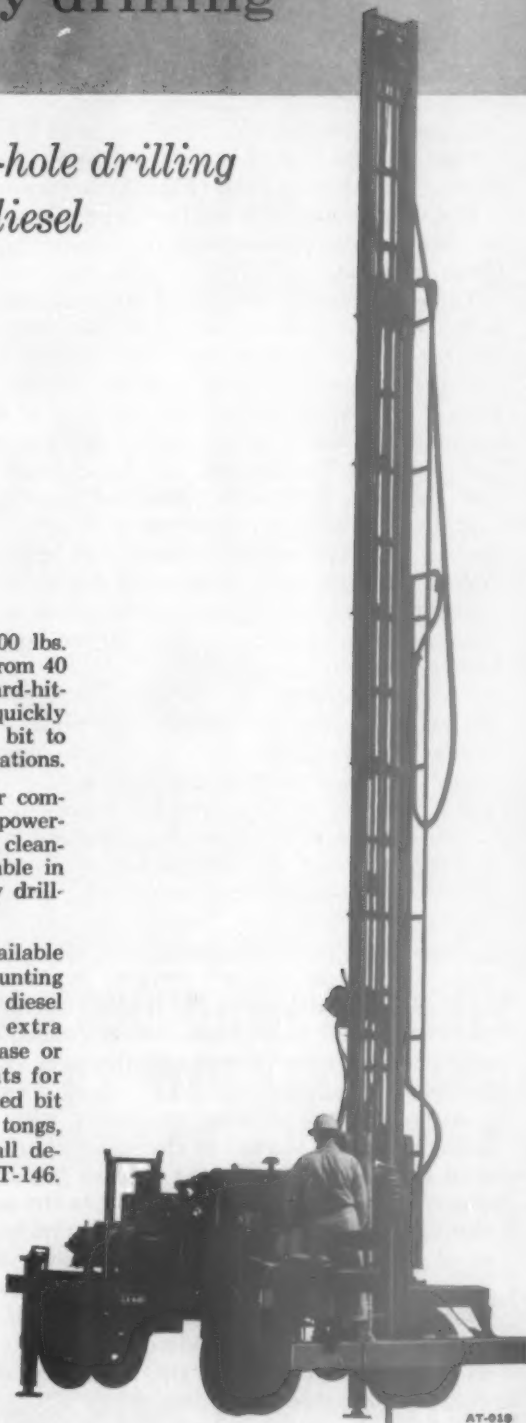
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AT-019

Beneficiation pays off . . .

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Plate feeders of the reciprocating type are used in the feeding of material which has already passed through one or two stages of crushing. They are usually somewhat lighter in construction.

Vibrating feeders are even lighter in duty and construction. They are extremely useful where the presence of both fines and moisture might tend to set up in the gates. Either the plate type (Fig. 24) or the feeder-grizzly type (Fig. 25) are available.

The wobbler-feeder is another type of combination scalper and feeder which is receiving quite a bit of attention.

The conveyor belt method of material handling is the most economical in power and labor, and has the highest capacity for dollar invested; but it also takes up more room than the average mill allows. Belt-slopes and speeds are usually established at the maximum allowed by size and moisture content of the material handled. Ribbed belts are frequently used. Since many of these plants operate only during daylight hours and shut down during extreme weather conditions, they are spread out in the open. Where cold weather operations are necessary, all sorts of measures to prevent freezing of the material on the conveyor belts are encountered.

In the construction of the conveyor supporting structure two general types are quite common: the channel type and the truss type. The length of span, the type of support, and head-room available are the factors which govern the selection of one or the other type. The rope or suspended conveyor is a relative newcomer to the field, and receiving increasing attention based on results achieved in the coal industry.

Where height requirements and space limitations demand it, the belt-elevator is sometimes used. The added cost of the buckets themselves, the extra power to lift them, and the added maintenance required by these vertical conveyors have limited their applications.

Although fixed stacker conveyors with rock-ladders to break the fall of the material are often used to build stockpiles, the modern trend is towards the radial stacker (Fig. 26) or the adjustable suspended stacker (Fig. 27). The first is lighter in construction and cheaper in cost, but is limited in height if undue fall of material is to be avoided: it makes use of space for volume of stock. The second which can be raised or lowered as well as moved transversally is the more efficient machine, if more costly, in using space.

The dredge ladder and pump are extraction devices used for many years in the production of



Fig. 29—Classifying tank and dewatering screws have been nested together on one transportable structure

sand and gravel and have been developed to a highly efficient unit. The pump is used in materials handling from the pit to the plant, since in many cases it has dynamic head capacity in excess of that required for the extraction phase alone.

The use of slurry pumps is increasing for handling slurries of sand and intermediate aggregates without the dewatering which conveyors would require. These pumps are used for transfer of material within the plant and in the disposal of waste products where zoning and stream pollution regulations require impounding. Many types are available, nearly all based on the horizontal centrifugal types common in the metallurgical industry.

The portable crushing and screening plant is the greatest departure from the metallurgical concept of processing plants which has evolved in the aggregate industry. This has been a result of market conditions and the nature of deposits. Although stationary plants are still economical near large urban centers, a large proportion of the concrete used in this country is for the highway construction program following a decentralization of population and manufacturing centers.

Large deposits are rapidly becoming exhausted. This has made it necessary for the producer and the user of aggregate to produce the materials closer to the actual job. At first semi-portable plants, which could be easily knocked down and re-erected were the logical answer. But since many of these contracts are on a penalty basis where time is of the essence, even the short delays in

Please turn to page 117

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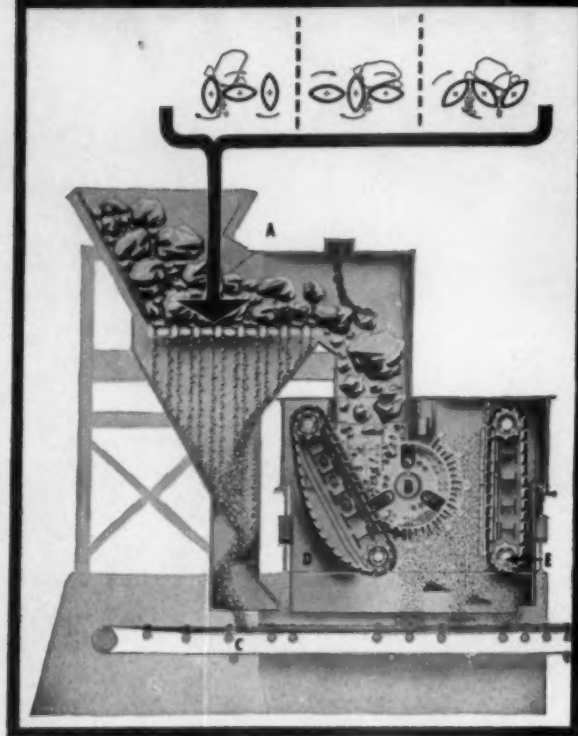


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Rocky's Notes

continued from page 22

only casually explored. In view of the immense deposits of dolomite in this country, research to utilize it for a cement would seem to offer an inviting field.

A study of the clinker burning process with different raw materials is reported by three of the faculty of Tokyo Institute of Technology. Part of their conclusions are as follows: "The reaction of CaO and clays containing quartz becomes remarkable above 1,100 deg. C. to form C₂S (2 CaO · SiO₂). Despite rapid cooling, this stage is accompanied by slight expansion and dusting [of the clinker]. The reactivity of high-siliceous clay is superior to that of low-siliceous clay combined with silica sand. Slag crystallizes as melilite, then absorbs CaO from C₂S. At this time considerable expansion occurs, but no dusting could be observed. The reactivity of the raw mixtures containing slag in addition to silica sand is excellent especially in the stage of C₂S formation up to 1,250 deg. C. However, above 1,250 deg. C. when C₂S formation takes place, the difference in reaction arising from the kind of raw material that is used decreases."

No analysis of the slag is given, but in other papers referring to slag, it appears that the slags contained appreciable percentages of MgO. It is well known that dolomite is frequently added to blast-furnace limestone to prevent dusting of the slag. Apparently, this property of MgO holds over, when such slag is used in a cement raw mix, preventing dusting of the clinker. This, and other papers, seem to show that the role of MgO in portland cement manufacture is far from being accurately known.

In order to know more about the reaction of gypsum and hydrated lime as retarders in the setting and hardening of portland cement, three faculty members of Tokyo Institute of Technology tested the effects of such retarders on each of the phases in the quinary system of portland cement clinker separately—clinker glass, its devitrified products, 3 CaO · Al₂O₃, 6.2 CaO · 2.2 Al₂O₃ · Fe₂O₃, and 4 CaO · Al₂O₃ · Fe₂O₃. The authors state: "Since each of these phases in the quinary system takes up about 10 percent of the clinker, each phase sample was diluted 10 times with fine sand, and then subjected to the setting-time test."

As to results, they say: "It was found that all of these synthetically prepared samples set rapidly, and the effects on setting and hardening by adding retarders such as gypsum, hydrated lime and their mixtures, as well as alkali carbonate,

were very peculiar, a fact which helps to clarify the mechanism of complex phenomena arising in the setting and hardening of portland cement.

"Hydrated lime is generally stronger as a retarder than gypsum, while their mixture is the strongest of all. In the clinker glass and its devitrified product the larger the amount of retarder added, the faster is the acceleration in their setting, but beyond a certain amount their setting is retarded. However, for aluminate and ferrite the setting becomes more retarded as the amount of retarder is increased. Alkali carbonate retards the final setting remarkably.

"Generally speaking, the addition of gypsum increases, while that of hydrated lime tends to weaken early strengths. The amount of gypsum required to attain maximum strength of the samples was about 10 percent except in the case of $3 \text{ CaO} \cdot \text{Al}_2\text{O}_3$, which required more than 30 percent... Alkali carbonate increases the strength of the samples without additives but cuts down the strength-increasing effect of gypsum."

Another paper by a faculty member of the University of Tokyo, in cooperation with three cement company chemists on "X-Ray Researches on the Influence of Gypsum Upon the Rate of Hydration of Portland Cement Compounds," led to the following conclusions: "Hydration of C_3S after one day tended to be accelerated by the addition of gypsum, particularly at early ages. In the case of a mixture of C_3S and C_2A , the addition of a proper amount of gypsum accelerated the hydration of C_3S until later ages, but that of an excess of gypsum showed this acceleration at earlier ages only. Such phenomena explain the mechanism of the favorable effect of a proper quantity of gypsum on the strength of cement.

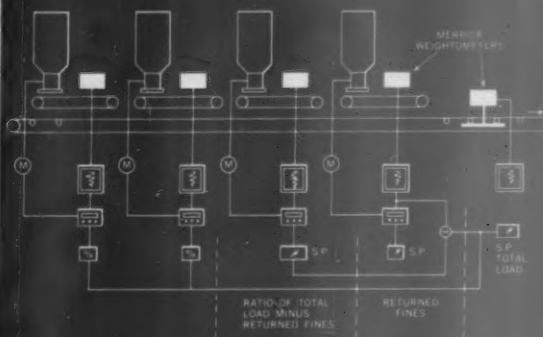
"The rates of the hydration of cement compounds came in the order of C_3S , C_2A , C_4AF and $\beta\text{C}_3\text{S}$. The rates of hydration of C_2A and C_4AF seemed to be very sensitive to the water content, the period of mixing, etc."

One of the most interesting papers appears to be a study by two cement plant chemists on the "Influence of Na_2O on the Formation of Calcium Silicate Hydrate." Without going into detail, the following conclusion seems to bear out some of the conjectures we have often made in these columns: "Sodium hydroxide seems to act as a catalyst in the formation of calcium silicate hydrate from $\text{Ca}(\text{OH})_2$ and SiO_2 in the presence of water. That is, sodium hydroxide can attack silica, form-

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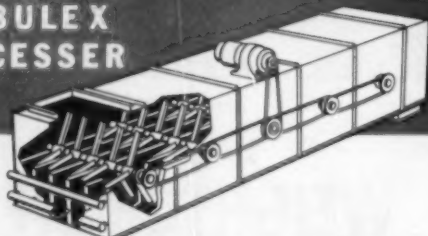
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Rocky's Notes

continued from page 115

ing sodium silicate, and then the calcium hydroxide reacts with the sodium silicate to precipitate CSH (B) - [according to Bogue this is $3 \text{ CaO} \cdot 2 \text{ SiO}_2 \cdot x \text{ H}_2\text{O}$]. In the latter reaction Na_2O is liberated from sodium silicate into the liquid phase and again attacks the remaining fresh silica particles to form sodium silicate. In these reactions a part of the sodium hydroxide is adsorbed into CSH (B)." In other words, if there is enough free silica present for the sodium hydroxide to react with, the presence of sodium hydroxide is helpful rather than otherwise, by making the silica more reactive. This is the reason, of course, that pozzolans are helpful—the more so the higher the alkali content of the cement. The point we have often tried to make is, that it should not be necessary to add a pozzolan, since the same objective would be accomplished by using a higher percentage of silica in the raw mix where it is impossible to make a low alkali cement with the raw materials available.

Among the papers on the manufacture of cement is a record of experience in removing clinker rings with a gun designed for that purpose; a study of the granulating mechanism in the disc type granulator; a study of the separating mechanism of selector blades of the Sturtevant air separator; the effect of gypsum on cement grinding. The latter paper seems to sustain the theory that gypsum is a grinding aid. The author's conclusions in part are: "(1) Regardless of whether the feed amount is large or small, the Blaine surface area of the cement when gypsum is added is 600 to 900 cm. $2/\text{g}$ larger as compared with cement without gypsum for the same amount of feed. (2) The reason is that when the feed amount is large the gypsum has a tendency to drift into the finer pulverized part of the cement, while in the case of small feed the gypsum acts as a grinding aid."

It seems to us the Japanese viewpoint is that there is no common problem in the manufacture and use of cement and concrete which cannot be studied and restudied with profit. We believe this is a right attitude toward any of our rock product industries. The ordinary cement chemist, or researcher, is too apt to conclude that the book is closed on many apparently simple problems. The Japanese appear not to accept that approach. Our researchers are too anxious to do "original" research. The Japanese appear to gain satisfaction and new knowledge by constantly rehashing "old stuff." Which is the better method of developing a science or an art we leave to the judgment of the reader.

END

How to keep conveyors rolling . . .

continued from page 92

as a lubricant between the rubber surfaces of the pulley and the belt and cause slippage. The object here, of course, is to eliminate the moisture. Herringbone-grooved lagging was designed for this purpose, as it allows the moisture to be squeezed off the lands and into the valleys where it can run off. If the pulley has smooth lagging, a tool for cutting tire treads can be used in an emergency to cut herringbone grooves.

Warm up your conveyor for 15 min. or so before using it if the weather is extremely cold. The internal friction will make it more flexible. If it's essential to operate it early on a cold morning, it is a good idea to run it occasionally during the night to ensure a quick start.

But of course the first principle, in winter as at any other time, is to keep your equipment in first rate condition. Idlers, pulleys, and drive should be lubricated with grease that will not "set up" in cold weather. Idler rolls should be checked to be sure that they turn freely, and those that do not should be repaired or replaced. Fresh grease helps to seal idler bearings against moisture and water, which can cause the bearings to freeze and prevent the rolls from turning in below-freezing temperatures. Lubricant levels in reducers should be checked, and the lubricant changed to one of lower viscosity if necessary. **END**

Beneficiation pays off . . .

continued from page 112

moving and re-erecting these plants at a new location became very costly. Further, conditions varied from one deposit to another and modifications had to be made to these plants to adapt them to the requirements of the new deposit.

There are two basic types of portable plants. Those supplied as a "package" by equipment manufacturers, and those fabricated by an individual producer to meet particular conditions encountered in his own operations. There is a considerable variety in these units depending on size and conditions of operations as well as material specifications which must be met. But in either case, the basic equipment and operating principles are the same as those encountered in a permanent installation. There are units whose primary function is

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continued from page 117

that of crushing (Fig. 28). These can be equipped with their own prime-moving diesels, or with electric motors driven from a separate generator unit.

Where fine aggregates require it, classifying and dewatering units have been combined into one package (Fig. 29). Where screening and dewatering are all that are required, screening-washing units are available. Finally, washing and dewatering alone can be added at any point where the processing will require it.

The aggregates industry is almost completely dependent on the construction industry for its market; consequently it has been forced to adapt itself to changing trends and demands of its customers. It has developed devices peculiar to its own field which are now being adopted by the metallurgical industry. Also, it has made use of equipment and processes evolved by the metallurgical industry and has adapted them to its own specialized requirements. As the requirements of the concrete engineer have become more demanding, ever increasing engineering knowhow has enabled the producer to meet the challenge. **END**

Tap perlite's mother lode . . .

continued from page 75

the two dryers, the principle source of plant dust. Two similar fans serve the conveyors, crushers, and screens. About 20 tons of dust per day are recovered from the base of the stack and blended into the ultra fines product. No additional attempts are made to eliminate escaping dust.

The seven finish products are stored in nine drive-under steel truck bunkers. Eight have a capacity of 250 tons; the ninth, which contains the ultra fines, has a capacity of 150 tons. Five hundred tons of storage are provided for the two most widely used sizes: 16 x 30 and 30 x 50 mesh.

Two 17-ton rear dump semi-trailers and one 24-ton dump unit haul the milled perlite to the blending and railroad loading facilities at Antonito, Colo., 24 miles to the north. All road haulage units are covered, to eliminate possible contamination or the addition of unwanted moisture.

Total storage capacity at the railhead is 1,050 tons. There the trucks dump into a hopper at the boot of a bucket elevator. The perlite is discharged onto an 18-in. belt conveyor that distributes it among the six enclosed storage silos.

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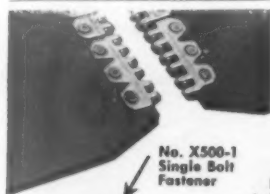
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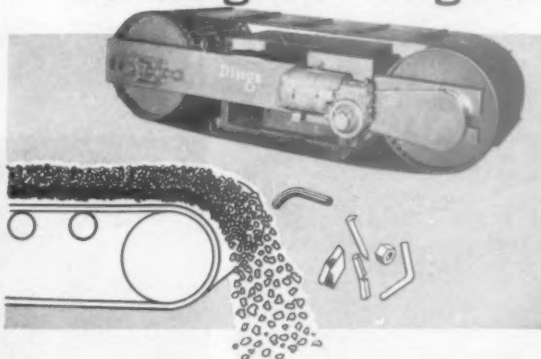


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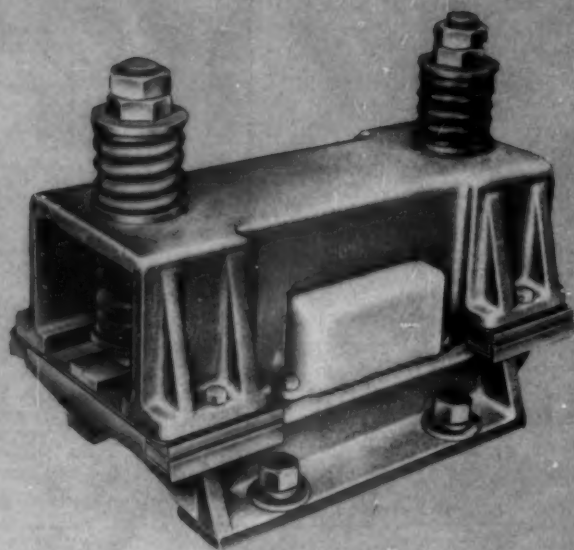
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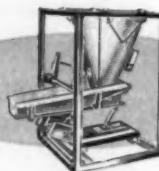


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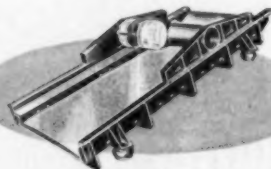
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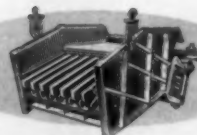
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It means you can meet every power need, from 20 to 1008 h.p., by using engines of just 2 different cylinder sizes—with up to 70% *interchangeability of parts* between engines in each series.

It means *lower parts costs*—up to 50% less than for Diesels built in a flock of different designs and cylinder sizes. Lowest servicing costs, too.

It means you can *meet growing horsepower needs* (without loss of existing parts inventory or maintenance know-how) merely by stepping up to the next engine in the series.

It means that all the advances of the past, present and future can be applied to *every* GM Diesel—whether it's in equipment you've had for 20 years, or one that's just off the line.

It means *the ultimate in standardization benefits*, with greater profits per engine on every GM engine you add.

No wonder so many equipment buyers specify GM Diesel power. Ask for it in your next piece of equipment.

Detroit Diesel Engine Division, General Motors, Detroit 28, Michigan. (In Canada: General Motors Diesel Limited, London, Ontario.)

GM DIESEL

SERIES 53 & 71 ENGINES

One proven design throughout the line builds greater value into every engine

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TRUCK TALK

by Chet Cunningham

If some of your rock trucks and equipment go into storage during the winter months, here are some suggestions how to do the job right:

- Wash each rig thoroughly, clean the cab. Check paint and touch up all exposed metal. Schedule repainting for this time.

- Remove windshield wiper blades and put them in the glove compartment. Wrap the end of the wiper arm with masking tape.

- Do a complete lube job and use light oil on all hinges, latches, linkage, pivot points, etc. Check gear lube in transmission and rear axle. Start engine and run long enough to reach normal operating temperature, then drain the crankcase. Fill it to the proper level using half rust inhibiting oil. Run the engine for about 5 min. at fast idle. Be sure the engine is thoroughly warmed up before the ignition is turned off. Leave this oil in the engine.

- Remove the spark plugs and squirt a couple ounces of rust inhibitor into each cylinder. Turn the engine over a few times with the starter, then replace the plugs.

- Drain the fuel tank, fuel lines, fuel pump. Disconnect the lines and blow dry with compressed air. Remove and clean the fuel pump and replace it. Remove the carburetor and drain, being sure to work the accelerator pump to force gasoline out of the accelerator well. Replace the dry carburetor and connect dry fuel lines.

- Clean the air cleaner and refill to right level. Seal all engine openings. Use wax paper and tape over oil filter, breather, air cleaner, tail pipe and other openings.

- Remove battery and store in cool, dry place. Drain and flush radiator and cooling system and leave drain cocks open. Release all brakes. Block clutch in disengaged position.

- If practical, put the rig up on jacks or blocks and bleed the tires to half of normal pressure.

If you use tube-type tires on your trucks, be sure that your men know how to work with them. Here are some tips:

- Never use a tube too small or too large for the casing

- Replace worn tubes; by the time the casing is worn to the unsafe point, the tube is worn out too

- After tire repair, always replace the valve core

- Have both tire and tube clean when mounting

- Use an accurate air pressure gauge

- Use valve caps to keep out dirt and moisture

- Never "balloon" a tube so that it stretches; this weakens it

- Always check tube pressure regularly during operation

In tires, the better the care, the better the wear!

Sometimes a hot engine is hard to start. This usually is caused by excessive fuel vapors in the intake manifold, a result of percolating or spill-over from the carburetor fuel bowl. Such a condition means there is a shortage of oxygen in the manifold. Solve it by opening the throttle wide to bring in oxygen and to flush out the manifold. Don't pump the accelerator—this makes the problem worse.

Do you have a torque wrench in your shop? They should be standard equipment these days. No more guessing how tight to make those bolts. Torque it to the specifications in your manual. If you don't get a bolt tight enough, it vibrates loose. If you tighten it down too hard, you might snap the stud or damage the threads. Remember, metal is elastic to a certain degree. Over-tightening can lead to over-stretching the metal and failure.

What about the year-round coolants that are now on the market? Can you use them in your trucks? Most experts say that they are good, and that they can stay in the recommended two years. Naturally, you will want to check these fluids for antifreeze protection and for rust inhibitor level at regular intervals. Include it in Fall servicing. Many new cars and trucks will come out with the new all-year coolant fluids as original equipment. If Detroit thinks they are this good, they must be O.K.

END



speeds production



with Haulpak[®] trucks

Almost overnight, Lompoc, California, once known mainly as "the flower-seed capital", has become a focal center of the Pacific Missile Range.

At such nearby installations as Los Alamos, Vandenberg Air Force Base, and the Navy's Point Arguello, launching pads, roads, and other facilities are being built at a record pace. Much of the high-grade aggregate for these projects is supplied by Missile City Rock Corporation from its big, new, crushed-stone plant.

To keep raw materials flowing to the crusher at a steady rate, the firm works 3 LeTourneau-Westinghouse 32-ton Haulpak trucks. Here's a pictorial report of these 380-hp haulers at work.

We will give you complete information on LW Haulpak trucks. 5 end-dumps, 22 to 65 tons, up to 600 hp. 90-ton bottom dump also available.



3,000 tons of overburden and rock is the average 8-hr-shift production for Missile City's 3 LW Haulpaks. Haul measures 2,500 feet, most of it down steep, winding 10% grade. Exclusive Hydrair[®] suspension keeps load riding level, cushions load and road shocks, gives longer tire life. In addition, this LW air-hydraulic suspension system eliminates springs, front axles, and related maintenance.

Operators highball the 32-ton Haulpaks down narrow winding road. High, off-set cab with non-glare, canted windshield gives operator good visibility. Other safety factors that give him confidence to work at fastest practical speeds: low center of gravity...LW power steering...and air-craft type multi-disc air brakes (5,148 square inches of braking surface).



Short 44'6" turn radius of the 32-ton LeTourneau-Westinghouse Haulpak permits fast positioning under dipper. And look at the extra load capacity you get within short 10'10" wheelbase. Deep V-body carries up to 8 tons of material below normal floor line...giving Haulpak low center of gravity, exceptional stability—on turns and slope work.



One of Missile City Rock Corporation's Haulpaks dumps rocky overburden at waste bank. Note that the twin 3-stage hoists are inverted to shed abrasive dust and dirt. Straight, smooth body floor, with no "kick up" at back, speeds ejection. Exhaust-heated body prevents material from sticking.

HP-2435-GJ-2

LETOURNEAU-WESTINGHOUSE COMPANY, PEORIA, ILLINOIS

A Subsidiary of Westinghouse Air Brake Company

Where quality is a habit



In Cement and Aggregates the Word for Air Separation is "Sturtevant"



in cement...

Sturtevant Air Separators make possible highly efficient closed-circuit systems. Large circulating loads increase output, eliminate overgrinding. Ball and lining life lengthens, power costs are lowered. Top quality cement results from precise control of finenesses. Standard 16 ft. Sturtevents deliver raw fines up to 70 tph, finished fines up to 260 bph.

in aggregates...

Sturtevant Air Separators classify sand without water, clean sand by de-dusting it. Pre-classification by air can also increase screening production by removing screen-blinding fines. In blending operations, Sturtevents select desired fines from grinder throughput. This graded product is then used to overcome fineness modulus deficiencies.

Send for Air Separator Bulletin No. 087.

STURTEVANT

MILL COMPANY

102 Clayton St., Boston, Mass.

Crushers • Grinders • Micron-Grinders • Separators
Blenders • Granulators • Conveyors • Elevators

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NEW LITERATURE

For free information on these items, simply fill out and mail postage-paid Reader Service Card found elsewhere in this issue

Converter report

General Motors Corp., Allison Div., has issued a report on the company's converters that are available for rock products producers' heavy machinery. With variable-speed control and torque multiplication, these converters with output shaft speed setting governors can be used in various rock crushing operations. Impact rotor speeds can then be varied from 550 to 850 rpm., and hammer mill rotor speeds generally run from 800 to 1,300 rpm. By adjusting the rotor speed with the converter output shaft governor, stone size can be regulated without the necessity of changing screens to accomplish the same purpose. Included in the report are field results, installation details and application pictures.

Enter 500 on Reader Card

Blast hole bits

Reed Roller Bit Co. has released an illustrated brochure that discusses the company's line of rock bits. Included in the catalog are air bits, lug protection, medium formation bits and soft formation bits. For each type of bit there is given a description and various specifications.

Enter 501 on Reader Card

Metal detectors

Morehouse Machine Co. has released an 8-page booklet that explains the environmental and operational factors which affect the sensitivity of radio frequency metal detectors. It also stresses the installation requirements necessary to satisfy oper-

ation of this equipment. The function and proper application of metal detectors are illustrated through reference to the company's metal monitor. Several models of these control units and search coils are shown, indicating the variety of applications possible.

Enter 502 on Reader Card

Rear-dump hauler

Ford Motor Co., Tractor & Implement Div., has announced a new bulletin that describes the company's rear-dump hauler. Presented in the literature are new cost standards for hauling in the unit. These are compared with old cost standards. Horsepower, vehicle weight, payload and road preparation are discussed and specifications are also given.

Enter 503 on Reader Card

Close-coupled pumps

Allis-Chalmers Mfg. Co.'s close-coupled, fractional horsepower, single stage-single suction pumps are described in new literature released by the company. These pumps are designed for handling of clear, non-corrosive liquids at temperatures up to 180 deg. F. Available in a range through 48 gpm. with heads to 100 ft., the pumps can be installed horizontally or vertically. Casings have centerline discharge, are self-venting and can be rotated to any of four 90-deg. positions. The leaflet includes performance curves and dimensions for the pumps.

Enter 504 on Reader Card



Conveyor belt engineering

Hewitt-Robins has released a booklet concerning the breakthrough in conveyor system engineering. As the result of a grant from the company, Pennsylvania State University engineers conducted an investigation to develop techniques to analyze separately the power consumed by troughing idlers, return idlers, return strand of belting and the carrying belt (both loaded and unloaded). The formula has been incorporated with other comprehensive data in this booklet. Complete statistical data and tables for calculating, engineering and selection of conveyor belting are included in the new publication. Also included are working conditions, new developed techniques, horsepower determination and takeup data.

Enter 505 on Reader Card

Cement booklet

The Rust Engr. Co. has released an 8-page "experience report" booklet of engineering and construction services for the cement industry. The booklet describes engineering services for production and distribution facilities employing advanced techniques to aid in plant design and process layout. Seventy-five construction projects are listed and recent cement plant projects are illustrated.

Enter 506 on Reader Card

Scrubber catalog

The W. W. Sly Mfg. Co. has issued a new catalog that describes the company's line of scrubbers for wet cleaning, absorption or cooling of gases resulting from a wide variety of industrial processes. The catalog includes a detailed description and illustrations of the impingement baffle plate design that is the key to cleaning efficiency with minimum power and liquid consumption. A cutaway drawing shows the flow of gases through the scrubber. Dimensions are given for standard single and multiple stage units in capacities ranging from 1,000 to 38,000 cfm.

Enter 507 on Reader Card

Operation & Maintenance

Mission Mfg. Co. has published an operation and maintenance manual that discusses general description, principles of operation, preparation for drilling, drilling operations and maintenance procedures. In each section are numerous photographs and diagrams that illustrate the comprehensive data. Tables are also included covering operating and physical data.

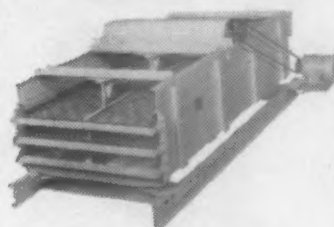
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Dry processing equipment

Sturtevant Mill Co. has made available an 8-page bulletin on dry processing equipment. The literature discusses the company's full line of laboratory and production equipment. Included in the illustrated bulletin is information on crushers, grinders, pulverizers, micron-grinders, air classifiers, granulators, blenders, mixers, feeders, screens, elevators, conveyors and mechanical dens and excavators. Specifications are given for the various types of equipment.

Enter 509 on Reader Card
Please turn to page 130

UNIVERSAL



Type "F" 42" x 96" Triple Deck

UNIVERSAL VIBRATING SCREENS have earned an enviable reputation for Efficiency and Dependability since they were first introduced a little over forty years ago. The Outstanding Performance and Low Maintenance cost of UNIVERSALS has been the result of their Simplicity of Design and Construction. Yet, UNIVERSALS have consistently cost less than other makes of comparable quality . . .

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A NEW BOOK BY JAMES A. NICHOLSON GIVES YOU THE SCORE

"Ready Mixed Concrete," is an historical, authoritative account of one of the fastest growing industries in the world.

Written especially for people in the Ready Mixed Concrete Industry the book is a harvest of factual information on every fundamental phase of the business.

Give a copy to every employee who has a hand in YOUR reputation for quality mixes, and in YOUR profits. Order your copies today.

Single copies only \$5.00 each.
Five to Twenty copies \$4.00 each.

ROCK PRODUCTS

79 WEST MONROE STREET
CHICAGO 3, ILLINOIS

New Literature

continued from page 129

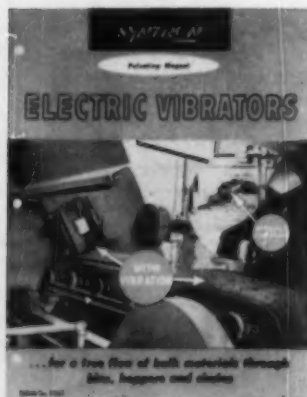


Flexible conveyors

Power-Curve Conveyor Co. has released a catalog describing its powered flexible conveyors used to load bags and packages into box cars and trucks. The catalog includes telescoping conveyors, multi-purpose systems, car-loading stackers, mechanical palletizers, in-car palletizing, bag flattening and elevating, and sorting and mixing conveyors. Typical floor plans are shown as well as product photos and a list of installations is included.

Enter 510 on Reader Card

Electric vibrators



Syntron Co. announces the recent publication of a 12-page bulletin on electric vibrators. Complete data and specifications of the company's 14 standard "pulsating-magnet" models, as

well as 3 pneumatic and hydraulic units, are presented. The vibrators, designed to promote the free flow of bulk materials through bins, hoppers and chutes, are shown with the aid of 50 illustrations. Vibrator accessories such as dovetail castings, waterproof and dust-tight cases, and cast iron explosion-proof cases are also illustrated and described.

Enter 511 on Reader Card

Welding handbook

Alloy Rods Co. has published a 64-page reference entitled "Handbook for welding low-alloy, high-tensile steels." The increased use and advantages of low-alloy, high-tensile steels in the relining or construction of quarrying haul vehicles, dragline or dipper buckets and chutes of all types has created a demand for information on the welding of such steels. This company has therefore compiled this reference guide for the maintenance man faced with these welding applications. The handbook contains physical properties and analysis and pertinent welding information on trade name steels commonly used in heavy equipment maintenance for high strength or abrasion resistance. Electrode recommendations are given for welding each of the steels shown.

Enter 512 on Reader Card

Drilling bits

Varel Mfg. Co. has released a bulletin covering the company's complete line of rotary bits. The three-way bits are made in sizes of 1 7/8 through 2 7/8 in. and the four-way bits are from 3 to 4 1/4 in. in diam. The carbide tips are applied in machined slots. Special pin sizes can be furnished. The illustrated catalog shows side and top views of both bits along with complete information as to diameter, pin sizes and prices.

Enter 513 on Reader Card

Magnetic separator

Dings Magnetic Separator Co. has issued a bulletin that describes a self-cleaning, automatic tramp iron separator that is available in three types for suspending over conveyors, chutes or spouts. The literature describes how the unit separates tramp iron from the burden by magnetic attraction—without manual attention for cleaning. New features listed include: deflector plate, permanent, non-electric magnets, gear head, non-magnetic belt facing and cleats, and unitized construction.

Enter 514 on Reader Card

Plant layout planning

Allis-Chalmers Mfg. Co. offers assistance to processing and/or plant and consulting engineers with a portfolio of crusher and screen plant layouts. The layouts cover first, second and third stage crushing operations with screen arrangements. The folder also carries selection guides to determining proper types and sizes of crushers and vibrating screens along with illustrations and a description of the equipment. The drawings are scaled for use as templates.

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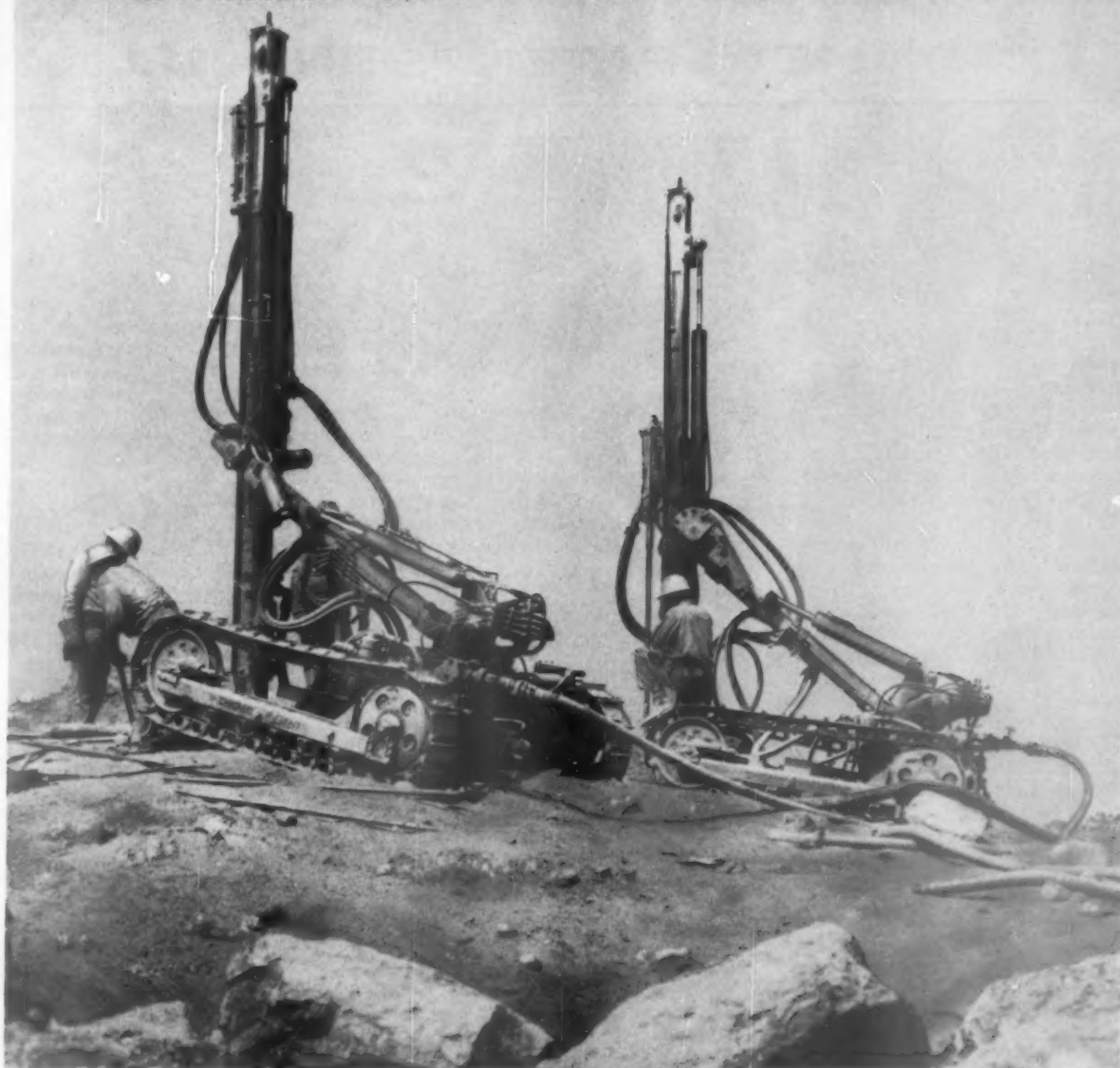
Bin feeder bulletin

Vibra Screw Feeders, Inc., describes the development, construction details and features of its live bin feeders for metering all dry materials in a technical bulletin. A partial list of more than 250 solid materials that have been metered accurately by the feeders indicates their wide use in industries. Metering rates for solids in various screw sizes of the feeders are tabled from 0.12 lb. per hr. to 8,400 lb. per hr., and in cu. ft. per hr. from 0.003 to 200.0 with an accuracy of ± 1 percent.

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END

G-900 Tracdril's have earned the respect of drillers for safe, sure-footedness when "set-ups" are toughest.



Pick a pattern . . . any pattern! You'll drill it fast and easy with the

G-900 TRACDRIL

"Boarding House Reach" describes the G-900 Tracdril's ability to cover any drill pattern with a minimum number of moves. With 180° horizontal boom swing, G-900's can drill at right angles over the tracks, left or right . . . handle high horizontals to 11 feet . . . toe holes at ground level. Big, sure-footed tracks beat any ground condition . . . provide a solid drill mount. Dual drill positioning controls, at turret and boom end, assure fast, accurate spotting . . . maximum drilling time. "Dead man" controls and fully automatic brakes that slam on the instant tramming throttle is released, lock unit on steepest slopes or treacherous terrain.



Chicago Pneumatic

8 East 44th Street, New York 17, N. Y.

AIR COMPRESSORS • PNEUMATIC AND ELECTRIC TOOLS • AIR-BLAST BITS • DIAMOND DRILLS • REICHdrills • ROCK DRILLS

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ROCK PRODUCTS, November, 1961

131

NEW PATENTS

by Oliver S. North

Recently issued patents on nonmetallic minerals*

Clays

U. S. 2,992,936—A coating grade **kaolin** product having good brightness, gloss and opacity is prepared by fractionating a natural kaolin so as to recover a fraction made up of clay particles of several size ranges in specific concentrations. (to B. W. Rowland; assigned to Georgia Kaolin Co.)

U. S. 2,994,616—In an economical method for reducing the viscosity of non-dilatant **kaolin**, such as Georgia secondary kaolin, to a usable level, an aqueous dispersion of the clay is admixed with at least 0.25 percent of a salt of guanidine, e.g. guanidine carbonate. The mixture is allowed to stand until complete dispersion occurs, and the treated clay is then filtered off. (to B. W. Rowland; assigned to Georgia Kaolin Co.)

U. S. 2,995,458—In a method for improving the rheological properties of **kaolin** by reduction of dilatant effects, an aqueous kaolin slurry is treated with a dispersing agent and a small amount of lithium hydroxide in a liquid medium. The slurry dilatancy is reduced at higher shear rates. (to H. H. Murray; assigned to Georgia Kaolin Co.)

U. S. 2,995,513—Method of preparing cationic quarternary ammonium ethers of starch for use in the flocculation of particulate solids suspended in water, such as suspensions of **kaolin** or other clays. (to E. F. Paschall & W. H. Minkema; assigned to Corn Products Corp.)

Canadian 624,171—Design for a chamber filter press especially suitable for processing difficultly filterable suspensions, e.g. or fine **kaolin** or other clays. Filter cake up to 2 to 2.5 cm. thick can be quickly accumulated, compared with a limit of 1 to 1.5 cm.

*Copies of United States patents are available at a cost of 25 cents each (photostat copies of foreign patents at 30 cents per page) from The Commissioner of Patents, Washington 25, D.C. For convenience, coupons, each good for one copy of any patent, may be purchased from that official at the rate of \$5.00 per 20-coupon pad or \$25.00 per 100-coupon pad.

in conventional filter presses. (to L. Demeter; assigned to Licencia Talalmanyokart Ertekessito Vallalat; 5 pp.)

British 870,320—In the production of a mullite porcelain in which cristobalite is not formed upon densification thereof, a mixture of 70-80 percent mullite grog, 20-30 percent **ball clay** and 0-10 percent **kaolin** is calcined, ground and cast or extruded to form the articles. (assigned to Ipsen Ceramics, Inc.; 3 pp.)

Cement

U. S. 2,993,687—In a wet process for manufacturing **portland cement** wherein improved fuel economy is realized, the raw feed slurry is filtered only until it reaches a plastic, putty-like consistency. It is then extruded to form spaghetti-like elongated strands, which are laid on a traveling grate in a controlled pattern and sintered. The sinter bed is one of optimum permeability. (to D. H. Gieskieng; assigned to Allis-Chalmers Mfg. Co.)

British 870,694—In an improved apparatus for removing dust from **portland cement** kiln off gases and for drying and preheating the raw feed, the exhaust gases are impinged against plates so that the contained solids are precipitated onto traveling conveyor equipment without the special provision of supplementary dust collectors. (to M. Neitzel; assigned to Polysius G.m.b.H.; 3 pp.)

British 870,833—In the production of a sulfate-resistant **portland cement**, the composition of the raw feed is adjusted so as to form a clinker having an alumina/iron oxide ratio not exceeding 3/5 and a silica/alumina-plus-iron oxide ratio of at least 9/5, and containing 1.5 times as much tricalcium silicate as mixed crystal phase containing iron oxide. Iron oxide and silica are the usual additives to standard raw feeds. (assigned to Dyckerhoff Zementwerke A. G.; 2 pp.)

British 872,346—Design for an im-

proved sealing arrangement for the connection between a rotary **portland cement** kiln and the stationary flue structure through which the preheated raw mix is fed into the kiln. (assigned to Klockner-Humboldt-Deutz A. G.; 9 pp.)

Trona

U. S. 2,989,369—In a method for diminishing the foam index of sodium carbonate derived from crude **trona**, the organic impurities are deactivated by bubbling chlorine or bromine into the crude trona solution in the crystallization step. (to R. T. Osborne; assigned to Food Machinery & Chemical Corp.)

Vermiculite

U. S. 2,991,170—In the production of fertilizers, nitrogen oxide gases are absorbed with an aqueous suspension of **bentonite**, **vermiculite** or **glauconite**, and the slurry ammoniated, dried and granulated (to K. Szepesi, T. Jancso & J. Varga)

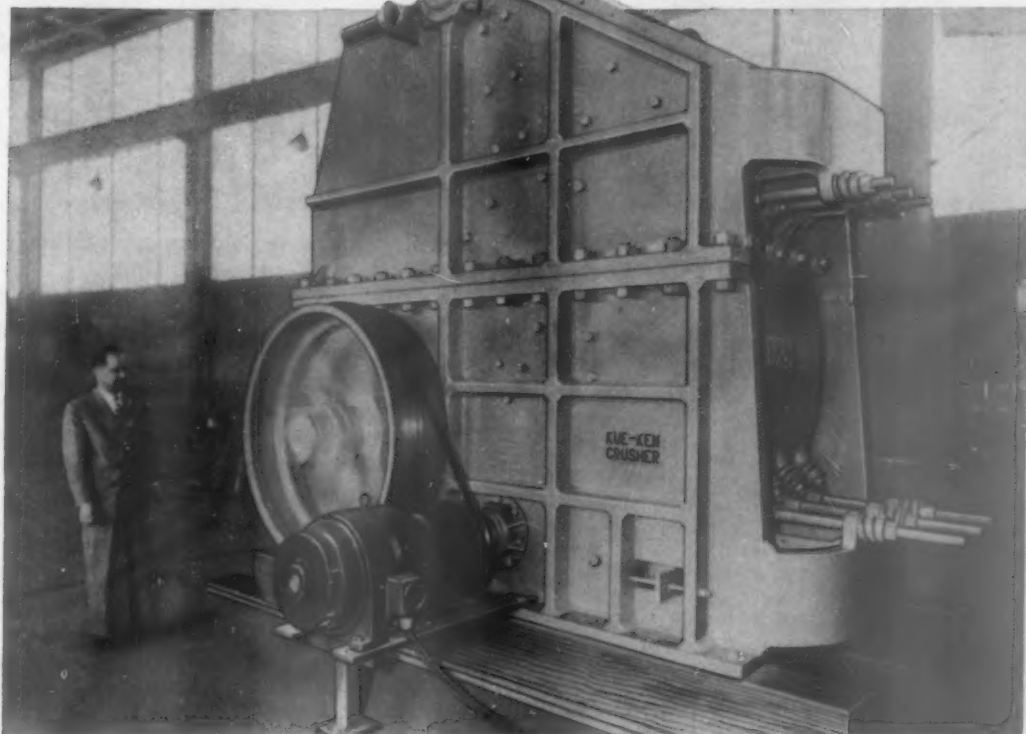
Canadian 622,609—Method of producing an improved composite aggregate than can be bagged easily, stored and handled without difficulty, and poured from the bags into the concrete mixer. A mixture of sand with 5-20 percent expanded **perlite**, exfoliated **vermiculite** or **expanded clay** is admixed first with a calcium chloride solution and then with a stabilized, mixing-type bituminous emulsion. (to G. Sucetti; 4 pp.)

Limestone

U. S. 2,991,017—Method for using supercritical speeds in the pulverization of **limestone**, whereby the grinding action is concentrated in a single zone of the mill and it is possible to dispense entirely with the use of grinding balls by simply adding coarse limestone pieces to the charge as needed. (to R. T. Hukki; assigned to Insinooritoimisto-Engineering Bureau, R. T. Hukki)

END

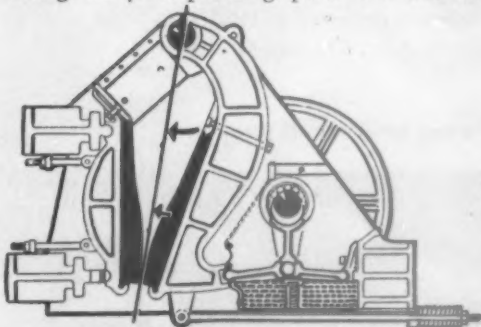
KUE-KEN® crusher starts on smaller motor... operates on less horsepower



A low cost normal duty squirrel cage motor provides ample power for starting and operating a Kue-Ken crusher on toughest rock. Every Kue-Ken crusher from the 12" x 7" to the 48" x 60" size is specially designed to give you from 1½ to 3 times more crushed rock per horsepower. No power is wasted lifting heavy reciprocating parts: the Kue-Ken crushing jaw swings as a pendulum from a stationary hinge pin. No power is wasted wearing out jaw plates: Kue-Ken jaw swings in an almost straight line to crush rock squarely without the conventional up-down rubbing motion. No power is lost from dirt clogging: Kue-Ken precision machined toggle mechanism operates in a sealed, filtered oil bath to reduce wear and friction to an absolute minimum.

The efficiency of Kue-Ken crushing is shown in the shop test of the above 48" x 42" model. Operating at 275 rpm, only 17 hp is required to run empty. A single vee belt and a 30 hp normal duty squirrel cage motor starts crusher with ease. Note also that crusher is not fastened to floor.

Kue-Ken runs at greater speed for higher capacity and a more uniform product. It provides positive protection against damage by tramp iron. An automatic, adjustable safety release integral with the flywheel ends shearing or breaking parts caused by tramp iron. In 33 sizes, Kue-Ken Crusher crushes more rock with less power for lowest cost-per-ton crushing.



Kue-Ken pendulum type jaw swings in an almost straight line to crush rock squarely without rubbing. Saves power, lengthens jaw plate life at least 5 times. Maximum leverage is where it counts most . . . at the top of the jaw for crushing large rocks.

KUE-KEN® CRUSHERS

"CRUSHING without rubbing"

STRAUB MFG. CO., INC. 8381 Baldwin St., Oakland 21, Calif.

Jaw Crushers Gyratory Crushers Overhead Eccentric Crushers Revolving Screens Classifiers Feeders Rib Cone Ball Mills Concentrating Tables Vibrating Screens

Pennsylvania Crusher Division, Exclusive Licensed Eastern Manufacturer and Distributor, 323 S. Matlack St., West Chester, Penn. Armstrong Whitworth (Metal Industries) Ltd., Authorized Licensed Manufacturer and Distributor. Close Works, Gateshead-upon-Tyne 8, England

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NEW MACHINERY

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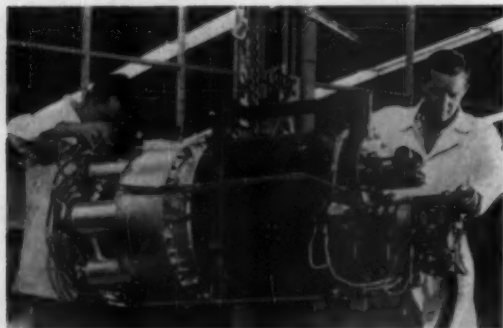
Sample splitter

A stainless steel sample splitter greatly improves the speed and accuracy of handling samples of crushed stone, sand, gravel or other free-flowing materials common in the rock products industry. Five standard chute widths are available, $\frac{1}{2}$, $\frac{3}{4}$, 1, 2 and $2\frac{1}{2}$ in., but special sizes can be made to order.

All are fabricated of stainless steel that resists chipping and corrosion. The short, steep division channels are easy to clean. (Soiltest Inc., 4711 W. North Ave., Chicago 39, Ill.)

Enter 100 on Reader Card

Power package of tomorrow



The gas turbine engine may never replace conventional reciprocating engines as a source of power for rock products producers, yet it shows promise of many advantages that should not be overlooked by cost-conscious managers. A gas turbine power package has exceptional power per pound of weight; while the lightweight units may

be easily transported and occupy relatively small space when installed.

Gas turbines reach full speed in less than $\frac{1}{2}$ min. and can be controlled closely at constant speeds or variable speeds. Automatic safety devices guard against overloads, overspeed or possible overheating.

Three basic types of power packages are now available. One produces energy in the form of compressed air to offer a quarry operator an economical source of air ranging between 35 and 350 psig. up to 2,700 scfm. Another type offers rotating energy from 50 up to 850 shaft hp., while the third unit offers a combination of both pneumatic and mechanical power. Exhaust temperatures range between 1,000 and 1,100 deg. F. and a heat release between 16,000 and 131,000 Btu. per min.

All units have a minimum of working parts—far fewer than reciprocating engines—and there are relatively few parts made to close tolerances. (Mission Mfg., Box 4209, Houston 14, Texas)

Enter 101 on Reader Card

Lightweight diesel engines

As diesel engines become lighter and more compact, their use becomes more advantageous to rock products producers. A new high-speed diesel engine is offered as a multi-purpose prime mover for long periods of uninterrupted service.

The Model 50A is the designation of a series of diesel engines which cover the range from 37 to 690 hp. at 1,800 rpm. with units from 2 to 12 cylinders. Many are available with turbocharging to provide a progression of power ratings over a wide range. Only two basic bore and stroke sizes are used, reducing the number of parts and the expense of maintenance.

With easy starting, fast response to load changes and dependability for continuous operation, the new units promise great reliability for operating generators in remote locations, dredge pumps and as prime movers for many other pieces of heavy machinery. (Fairbanks, Morse & Co., Diesel Div., Beloit, Wis.)

Enter 102 on Reader Card

Please turn to page 136

Expanda-Kraft offers "strongest, toughest shipping protection" says Owens-Illinois Executive

"We can recommend Expanda-Kraft unhesitatingly whenever a customer asks for strong, tough, maximum shipping protection that can be provided for his product—no matter whether it be alfalfa or yeast, asphalt or zinc sulphate, or anything in between," says P. L. Chism, Plant Manager, Owens-Illinois' Multiwall Bag Division, Valdosta, Ga.

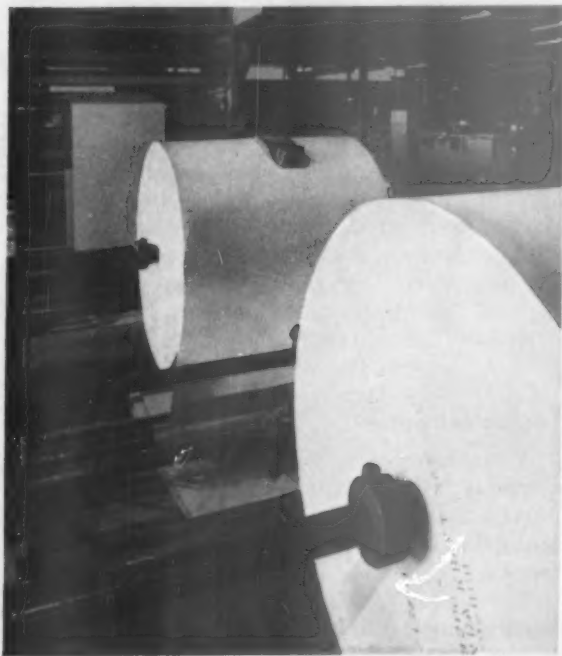
"In heavier bag weights, the Expanda-Kraft paper actually saves the customer money by reducing the total basis weight required, while furnishing more strength than can be available with comparable weights of standard flat kraft.

"Expanda-Kraft produces a sharp and clear printed image because of its low absorbency. Not only do we score an impressive bonus in appearance, thanks to Expanda-Kraft, but it also helps us cut down on ink and glue costs because of this lower absorbency," Mr. Chism reports.

"Our customers particularly appreciate the porosity of Expanda-Kraft paper, for it facilitates the escape of air during filling, a vital factor in maintaining efficient filling rates with valve-type bags. Ordinarily, this kind of porosity might connote high absorbency, but such is not the case with Expanda-Kraft."

Find out what Expanda-Kraft® can do to improve your package. *The H&W Division of Scott does not make bags.* But we do make

Expanda-Kraft paper in basis weights of 40 to 100 lbs. and in colors of Natural, Shell White and a clean, bright White. For infor-



mation and samples, write Hollingsworth & Whitney Division, Scott Paper Company, 230 Park Avenue, New York 17, N. Y. or 111 West Washington Street, Chicago 2, Ill.

Hollingsworth & Whitney Division
SCOTT PAPER COMPANY

Enter 1060 on Reader Card

New Machinery

continued from page 134



Plastic hard hats

Hard hats are now offered made from a newly developed high-strength plastic that combines the strength of metal with the natural resilience of plastics. The new plastic is polycarbonate and it gives hats made with it unprecedented impact and puncture resistance, exceptional insulation capacity and great resistance to chemicals, acids and abrasives. It maintains flexural strength and rigidity throughout the range between -100 and 270 deg. F. Hats are available in nine non-fading colors to conform with practically any color-coding system. (Mine Safety Appliances Co., 201 N. Brad-dock Ave., Pittsburgh, Pa.)

Enter 103 on Reader Card

Torque converter

A new heavy-duty torque converter will soon be available for applications in the rock products industry that can use the advantages of torque multiplication previously only available on haulage trucks.

The Model TC-400 is designed to handle 600 lb.-ft. of engine torque at speeds up to 3,000 rpm. With a three-element converter, torque multiplication ratios up to 3.6 to 1 are possible and a fluid coupling range gives "free-wheeling" for increased operating efficiency.

First application of the new units has been on impactors and other crushers with fluctuating loads. Product sizing has been achieved through speed control of the transmission unit rather than through the extensive use of vibrating screens and recycle conveyors. (Allison Div. of GMC., Indianapolis, Ind.)

Enter 104 on Reader Card

High-strength refractory

A new gunning castable refractory material has a recommended use temperature of 2,500 deg. F. Known as Kaogun-HS, the new castable is suitable for lining stacks, flues, by-pass ducts and dust collectors. Placed by either wet or dry gun methods, it produces a high-strength monolithic body that has exceptional abrasion resistance. (The Babcock & Wilcox Co., 161 E. 42nd St., New York)

Enter 105 on Reader Card

Blasting agent

Austenite 30 is the name of a new, high-density blasting agent. With a density of 1.2 and a speed of 14,000 pfs., wider spacing of blast holes or a smaller amount of blasting agent is possible without reducing effectiveness. The new agent is offered in spiral-wrapped fiber containers from 4½ to 9 in. diam. Priming is done with regular dynamites or gelatins or with the maker's line of primers. (Austin Powder Co., Cleveland, Ohio)

Enter 106 on Reader Card

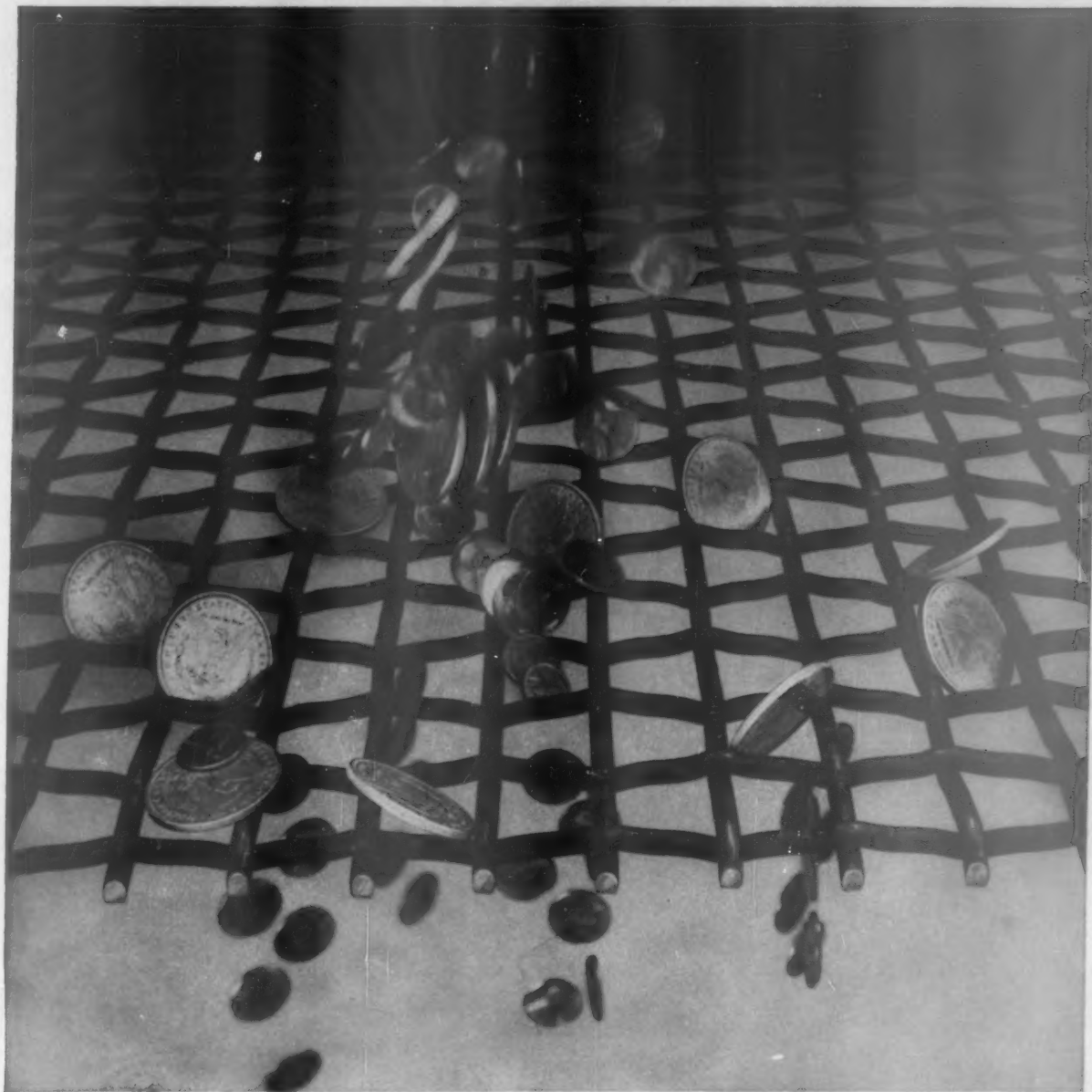
New tractor shovel



The HD-7G is a 1¾-cu. yd. tractor shovel, sixth in the maker's line that ranges from 40 to 225 hp. This new medium-capacity unit has a 100-hp. turbocharged diesel engine. Combined with a torque converter and a single-lever power shift transmission, the new tractor shovel has an almost infinite range of working speeds. There is no surge of speed when the load is lightened nor slow-down when it is increased. A ground speed control governor holds the working travel speed to a speed selected by the operator to match working conditions. (Allis-Chalmers Mfg. Co., Construction Machinery Div., Milwaukee 1, Wis.)

Enter 107 on Reader Card

Please turn to page 138



This screen never passes the buck

When you use CF&I Space Screens, you'll find your costs will be reduced from "dollars" to "pennies."

Because of their great resistance to the most punishing abrasion and vibration, CF&I Space Screens are long-lasting on even the toughest jobs. This cuts your screen repair and replacement costs, reduces equipment downtime and lowers the cost-per-ton of material screened. Your CF&I representative will be happy to give you complete details. Call him today.



The Colorado Fuel and Iron Corporation
 Denver • Oakland • New York
 Sales Offices in All Key Cities
 Enter 1058 on Reader Card

New Machinery

continued from page 136



Dragline bucket

Featherlite is the name of a newly designed dragline bucket offered for heavy-duty digging and material handling applications. It features a completely hard-surfaced alloy steel lip that will adsorb shock, resist wear and operate at low temperatures without cracking. Either manganese steel or forged alloy steel teeth are available. Lightweight hitch plates are designed to reinforce the bucket sides, arch, and lip and to give uniform pulling under all operating conditions. (Drake-Williams Steel Inc., Omaha 8, Neb.)

Enter 108 on Reader Card

Individual air conditioning



A new dust protection system for the individual worker permits him to work efficiently in hot, dusty atmospheres. More total protection is offered than by any combination of individual safety devices now available. This is achieved with a helmet with enclosed, air-conditioned face plate that does not limit normal vision.

Clean filtered air is pumped into the enclosure to keep out dust and fume. If necessary, the air may be cooled to let the worker enter ducts, coolers or other hot, dusty enclosures. (Jamieson Laboratories, 7900 Haskell Ave., Van Nuys, Calif.)

Enter 109 on Reader Card

Two-stage compressor

A new series of S2 stationary, air-cooled compressors is offered to meet rock products producers' needs for greater volumes of compressed air at higher pressures. Two basic models deliver 200 to 600 cfm. of air at 250 psi. They can supply air for portable drilling rigs and for high-speed, heavy-duty drilling in quarries. With air cooling, there are no problems of water supply.

One model, the 253, is a 3-cylinder unit that delivers 200 to 275 cfm. through a single high-compression head from a power takeoff or separate engine drive. The other, the 256, is a 6-cylinder compressor that produces 400 to 600 cfm. depending on the rpm. selected. (LeRoi Div., Westinghouse Air Brake Co., Sidney, Ohio)

Enter 110 on Reader Card

Heavy-duty reducers

High-strength fabricated steel housings are designed to assure the strength, rigidity and alignment of the internal parts of a new line of right angle helical reducers. The extremely heavy construction of the Maxi-Power drive series resists deflection under loading or impact. At the same time, the units have an extremely favorable thermal rating.

The new line is offered in 45 sizes of double and triple reduction in ratios between 9 to 1 and 211 to 1. A wide range of torque and horsepower ratings permit a selection of capacity to meet virtually any application. (Foote Bros. Gear & Machine Corp., 4545 S. Western Blvd., Chicago 9, Ill.)

Enter 111 on Reader Card

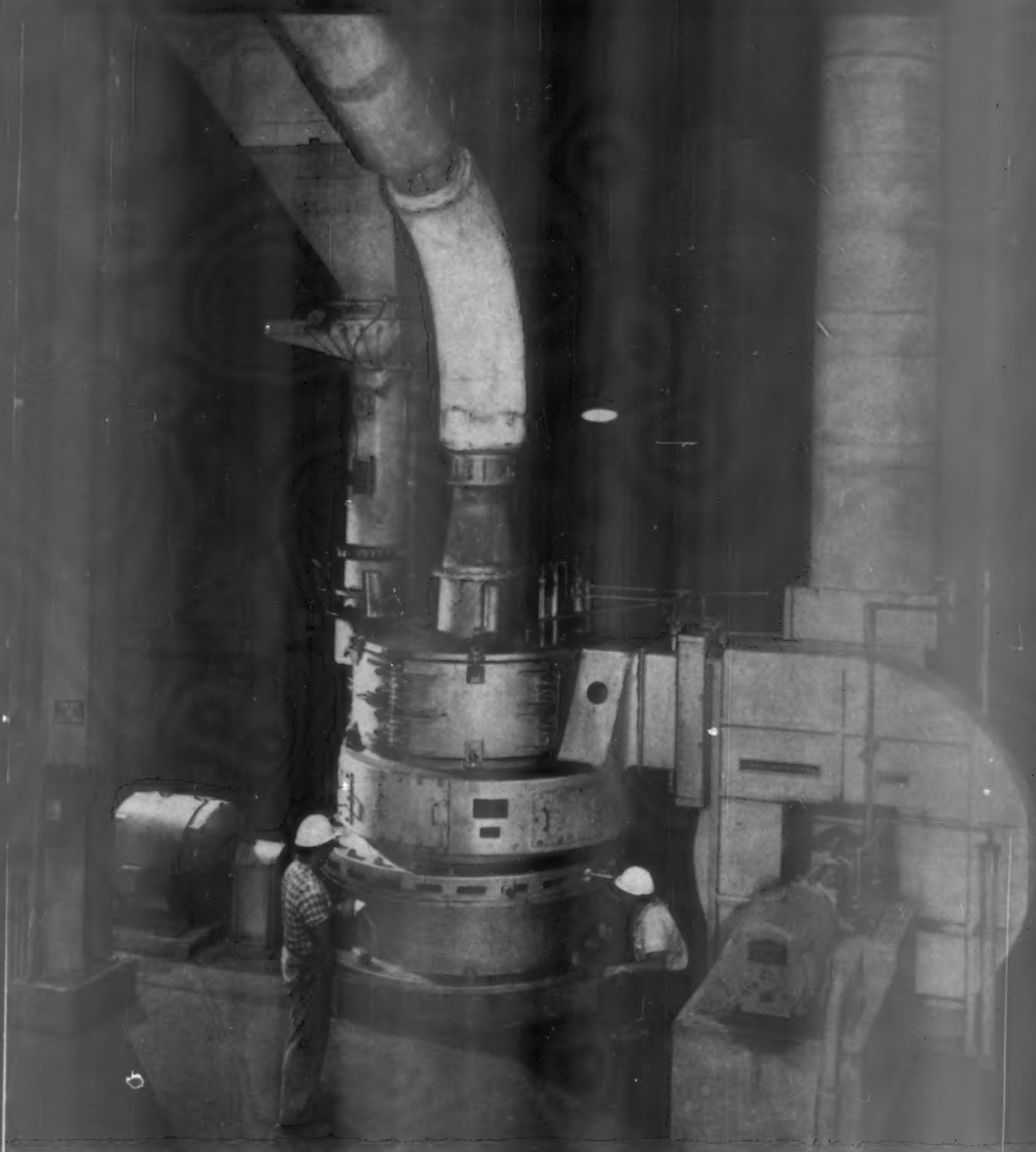
Self-aligning sleeve bearings

A new line of self-aligning, self-lubricating sleeve bearings is available to solve many difficult lubrication and maintenance problems involving light duty and slow speed bearing applications. Bearing material in the Flex-Block standard flanged block or pillow block is an oil-impregnated bronze. This material has proven to be ideal for the hot, dusty atmospheres or the wet, abrasive conditions common in different segments of the rock products industry. Apparently the bearings will operate satisfactorily even under water.

The sleeve bearing is held in the housing with a set screw. When this is backed off, the sleeve may be rotated 180 deg. to renew the bearing surface. This is done without removing the block from the shaft. (Link-Belt Co., Prudential Plaza, Chicago 1, Ill.)

Enter 112 on Reader Card

Please turn to page 140



Latest score at Lehigh Portland Cement Co. Production: 1,512,000 bbl. Pulverizer maintenance: \$0.

Twenty-four hours a day, fourteen months in a row, a B&W pulverizer has been grinding it out for Lehigh Portland Cement Co., Alsen, N. Y.

During this time, the direct-fired $11\frac{1}{2}$ x 400 ft. rotary kiln has produced 1,512,000 barrels of cement. The B&W pulverizer feeding the kiln ground and dried more than 30,000

tons of bituminous coal. In spite of this rugged duty, the pulverizer has required no maintenance.

Maintenance is low because of the wear resisting materials used. The rings are manufactured from B&W's exclusive Elverite C alloy. The balls are heat treated alloy steel.

Grinding elements maintain full

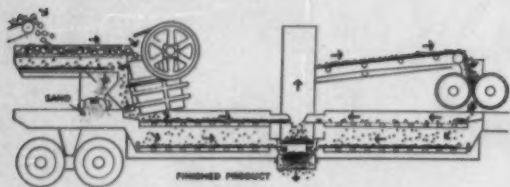
contact throughout their lifetime, resulting in maximum fineness and greater production. The B&W pulverizer has helped Lehigh achieve an exceptionally low kiln coal rate.

The Babcock & Wilcox Company, Boiler Division, Barberton, Ohio.

Babcock & Wilcox

New Machinery

continued from page 138



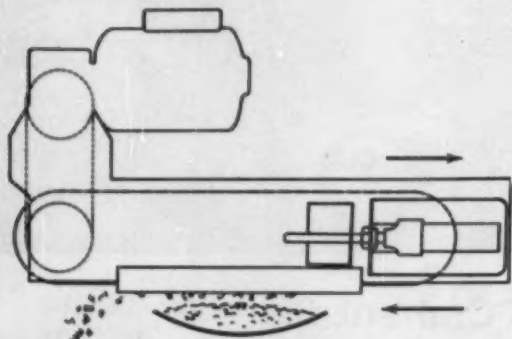
New portable preparation plant

A portable crushing and screening plant of radically different design virtually eliminates belt conveyors from the materials handling circuits. Instead, a battery of three double-deck vibrating screens sizes and conveys aggregates at the same time. Only one belt conveyor is needed to take materials from the elevator to a secondary crusher. The new Uni-twin incorporates two crushers with independent drives on its 39 ft. long steel frame. Crushers may be selected for the job to be done—jaw, roll, gyratory or a combination of these crushers.

Screens and crushers are open and easily accessible for inspection and maintenance. Screen cloths may be changed readily to give the operator the opportunity to make a wide variety of sizes and gradations. First unit in production has a capacity of better than 375 tph. of minus ¾-in. crushed limestone. Units working on gravel have reached 500 tph. making 1 in. x 0 base course materials. (Lippmann Engr. Works, Inc., 4603 W. Mitchell St., Milwaukee, Wis.)

Enter 113 on Reader Card

Self-cleaning magnet



Three types of a new magnetic tramp iron separator are offered for operation with belt conveyors, transfer chutes or loading spouts. The Perma-Plate self-cleaning magnetic separator is automatic in operation and self-cleaning, picking up magnetic materials from bulk materials conveyors and discharging the tramp metal without operator attention.

Features of the new magnetic device include permanent magnets which are enclosed in a stainless steel housing and a deflector plate that protects the magnets from surges on the belt. A non-magnetic cross-belt carries tramp metal to one side of the main conveyor. The belt is driven with a gear-head motor and enclosed in a welded steel, self-contained framework that is easy to mount above a conveyor belt. (Dings Magnetic Separator Co., 4740 W. Electric Ave., Milwaukee 46, Wis.)

Enter 114 on Reader Card

Gasoline engine

Newest addition to this maker's line of gasoline engines is the UV-345. The 8-cylinder, valve-in-head engine has a horsepower rating of 158 at 3,000 rpm. for the industrial applications in the rock products industry. Dimensions of the new compact engine are 39½ in. high, 33½ in. long and 38½ in. wide and a weight of 740 lb. While the unit is now available for gasoline, it will be offered for natural gas and LPG fuel. (International Harvester Co., 180 No. Michigan Ave., Chicago 1, Ill.)

Enter 115 on Reader Card

New style in hard hats

A new all-plastic hard hat without metal parts meets all safety and electrical specifications. At the same time, they are light in weight, moisture-proof and comfortable to wear. Winter lines are available, and break-away chin straps can be supplied. Goggles, helmets and face shields may be attached to these hats or caps without drilling holes or adding metal clips. (American Optical Co., Southbridge, Mass.)

Enter 116 on Reader Card

Heavy-duty flexible coupling

A giant new cushion coupling is the largest unit in the maker's line of Para-Flex couplings. The new PX 280 has more than twice the torque capacity of the next smaller size. However, it has the same type of tire-shaped flexing element to accommodate angular and parallel shaft misalignment. At the same time, it can adsorb end-float, shock and vibration.

Capacity of the new unit is 400 hp. per 100 rpm. up to the maximum of 910 rpm. Taper-Lock bushings permit stock delivery for shafting up to 7 in., but bored-to-size couplings are available up to 9 in. diam. (Dodge Manufacturing Corp., Mishawaka, Ind.)

Enter 117 on Reader Card

Please turn to page 142

Star of so many long run performances



**CONTINUOUS
PERFORMANCE!**

SECO SCREENS

The SECO name will probably never end up in lights on Broadway. But aggregates producers from Maine to California can testify to their SECO SCREENS' ability to consistently perform year in and year out. And SECO SCREENS are not primadonnas . . . they're not temperamental or touchy . . . the rougher the going the better they like it! But don't take our word for it . . . ask your fellow-producer in the next seat what he thinks of SECO SCREENS. Chances are he'll tell you SECO is the star of his show, too.

ADDED ATTRACTION . . .

Send for 4-bearing Catalog No. 205
or TWIN BEARING literature TB-21

No need to worry about spare parts with SECO SCREENS. On those occasions when you'll need a part, remember, SECO ships standard parts the SAME DAY YOU ORDER THEM!

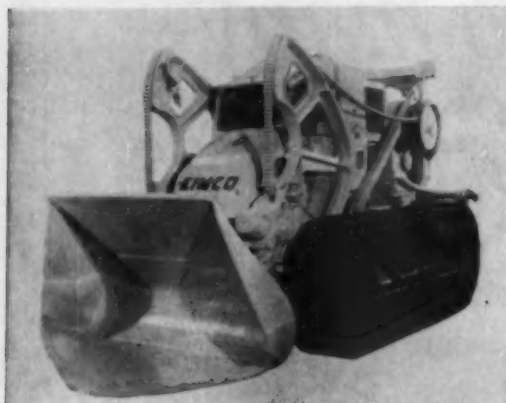
SCREEN EQUIPMENT CO., INC.

Buffalo 25, New York



New Machinery

continued from page 140



Electric excavator

An electrically powered unit has been added to this manufacturer's "100" line of crawler tractor units. The 105E excavator with its 100-hp. ac. electric motor and 1-cu. yd. bucket was designed for indoor and underground applications to overcome the problems of engine fumes and smoke. But it is equally efficient for handling materials in restricted areas with electric power.

The massive, 38,500-lb. machine has speeds up to 4.2 mph., either forward or reverse, with drawbar pull of 40,000 lb. It has a 2-speed transmission and a 2-speed power-shift bucket control. The tefc. motor is fully protected against overload and operates on 50 or 60 ph. current at 220, 380, 440, 500 or 550 v. (The Eimco Corp., 634 S. 4th St. W., Salt Lake City, Utah)

Enter 118 on Reader Card

Premixed blasting agent

NCN-1 is the designation of a newly developed nitro-carbo-nitrate blasting agent. Since it is premixed, blasting crews are relieved of the chore of adding fuel oil to conventional ammonium nitrates. At the same time, the evenly and thoroughly mixed material assures maximum energy output in the blast. NCN-1 is said to be ideal for small-diameter holes and for use in underground blasting. (Spencer Chemical Co., 405 Dwight Bldg., Kansas City 5, Mo.)

Enter 119 on Reader Card

Low-range oxygen analyzer

An entirely new concept of the principle of paramagnetism has been incorporated into an explosion-proof, low-range oxygen analyzer. A continuous, accurate record of the oxygen content of a gas is provided by measuring and recording the paramagnetic variations in gas samples. When

coupled with the maker's sampling system, the new analyzer is said to give extremely fast response to fluctuations in oxygen content.

Dual-range design permits tracking while the process is brought within normal operating range. There are no moving parts to wear or break, while failure in either the upper or lower measuring units is quickly isolated by a built-in check switch. Both measuring units are readily interchangeable with factory pre-calibrated units. (The Hays Corp., 742 E. 8th St., Michigan City, Ind.)

Enter 120 on Reader Card

Six-speed drive

Any one of six speeds may be selected and remote-controlled by push button with the Selectro-Shift drive. Hydraulic clutches are activated by solenoids to change speed under full load, and the drive can be operated in either forward or reverse in all six speeds.

The new drive is available in 20, 25, 30 and 40 hp. Each is housed in a semi-steel cast gearbox to assure accurate alignment of bearings and all working parts. Full rated horsepower is delivered at the output shaft for every speed selected. (The Lima Electric Corp., Lima, Ohio)

Enter 121 on Reader Card

New strength for heavy tires

Millions of pieces of shredded wire in the heavy-duty tires used in the rock products industry promise greatly increased tire life and resistance to the hazards of operation over user's haul roads. The fine wires provide a barrier of high tensile steel that resists cuts and punctures. At the same time, the wires limit the growth or tearing of cuts which do occur. Other advantages have been demonstrated, including superior adhesion between tread and tire body and a much stronger carcass. (Good-year Tire & Rubber Co., Akron 16, Ohio)

Enter 122 on Reader Card

Variable-speed drives

This manufacturer's line of Vari-Tex variable-speed drives has been broadened to include five different sizes, from 1 to 30 hp., and stepless speed changes between 2 to 1 and 10 to 1 ratios.

All units are offered with electrical and mechanical controls to extend the versatility of the line. All are available for vertical, horizontal or 45 deg. mounting and for assembly with practically any motor enclosure, including totally enclosed vapor-proof and explosion-proof motors. (Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.)

Enter 123 on Reader Card

END



**Concrete products plant reports
on DEISTER Screen operation:**

**"EXACT SIZING . . . NOT A
PENNY FOR MAINTENANCE"**

A well-deserved reputation for quality has made Spickelmier Industries, Inc. of Indianapolis one of the largest manufacturers of concrete products in the Midwest. Now in its 51st year, Spickelmier is able to maintain highest quality standards because it strives to control all factors of production from raw material to finished product. This, according to President Carl F. Spickelmier, is the reason why the company began its own sand and gravel plant operation in 1941.

Aggregate production has expanded steadily over the years, and Spickelmier now supplies outside customers as well as its own manufacturing needs from this plant. During the construction season a stockpile of 40,000 tons is kept on hand.

The full plant load of 150 tons per hour is fed to a three-deck 4' x 14' Type UF horizontal Deister Screen which was purchased in April, 1960.

As the material passes across the screen it is sprayed with water at the rate of 400 gpm.

With screen deck openings of 1-1/4", 9/16" and 3/16", the Deister Screen produces four finished aggregate sizes for Spickelmier. In describing this screen's performance, Yard Supervisor Fred Gelzleichter had this to say: "Our specifications call for exact sizing and that's what we get from this Deister. We haven't spent a penny for maintenance since the day it was installed."

Changing screen cloth is a lot faster too, according to Plant Operator Albert Gantz. "We can change the bottom screen on the Deister in about half an hour. On our other screen it takes a whole day to change the bottom screen deck because we must remove the top deck to get to the bottom one. Figure that in terms of production time and you can see why we like the Deister Screen."



Fred Gelzleichter, in charge of gravel plant operations, Spickelmier Industries, Inc.

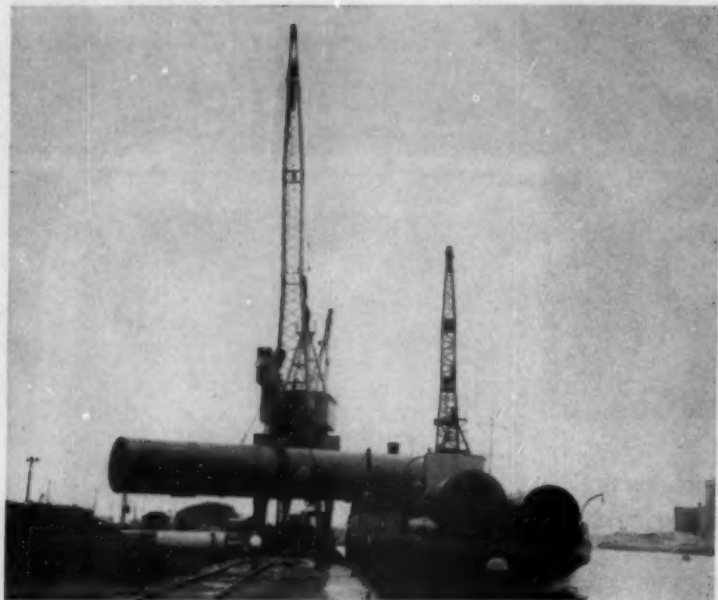


DEISTER MACHINE CO.
1933 E. Wayne St., Ft. Wayne, Ind.



Enter 1059 on Reader Card

MANUFACTURERS NEWS



Waterways carry record-size kiln shipment to Huron

In Allis-Chalmers' first all-water domestic shipment, 7 sections of a new 460-ft. kiln plus accessory equipment were recently transported by barge because of their great size to the Huron Portland Cement Co., Alpena, Mich. The sections varied in length from 40 to 85 ft., in weight from 68,000 to 173,435 lb., and in extreme outside diameters from 13½ to 15½ ft. Heaviest piece ever lifted in the port's history was an 85-ft., 86½-ton kiln section. This was handled by a 90-ton crane, heaviest capacity land-based gantry on the Great Lakes. The 36-hr. water shipment was routed through the Straits of Mackinac, which join Lake Michigan and Huron, to Alpena on the west shore of Lake Huron.

When the new kiln becomes fully operational in 1962, Huron Cement will add 2 million bbl. of cement capacity annually. It now has an annual capacity of 12 million bbl. The kiln is part of a 15-yr. expansion program recently announced by National Gypsum Co. for its Huron Div.

Sheehan joins Fuller

The Fuller Co., Catasauqua, Pa., has announced the appointment of John M. Sheehan, Jr., as advertising manager of the company. Mr. Sheehan is rejoining the Fuller organization, where he served as assistant advertising manager from 1958 to 1960. Prior to rejoining Fuller he was district manager for Putman Publishing Co. He was also an adver-

tising field representative for John W. Eshelmen & Sons, Lancaster, Pa., from 1954 to 1957. He graduated from Franklin and Marshall College.


L&N launches road tour

A white, 35-ft. trailer is placing Leeds & Northrup Co.'s products on the customers' doorsteps during a 20,000-mile, 21-state tour. Displays, showing a representative selection of all the company's equipment lines, will be set up in hotels and motels along the route. Bearing the legend "Cavalcade of Modern Precision," the van will also carry the company's line of hardware now on



display at various exhibits. Especially featured throughout the West will be the new line of recorders for process control. This tour will continue after Christmas into other areas of the country. At each stop the display will be tailored to the needs of the particular area and will be under the control of the local L&N district office manager. In addition to the regular city stops, special exhibits will be held at a number of large plants en route. The trailer is manufactured by the Trailmobile Co., Cincinnati, Ohio.

Please turn to page 146



How two variables * make a constant winner



B
BUCYRUS-ERIE COMPANY
E

The 40-R drills 6 $\frac{1}{4}$ to 9-in. holes with electric or diesel-electric power. For bigger jobs, the all-electric 50-R drills 9 $\frac{1}{4}$ to 12 $\frac{1}{4}$ -in. holes.

The Bucyrus-Erie 40-R has been constantly setting new footage records. Here are two important reasons:

* **VARIABLE DRILLING SPEED** — Ward Leonard variable voltage control lets you choose the correct rotary speed for a given formation and adapts instantly to changes without stopping the drilling operation.

* **VARIABLE PULLDOWN PRESSURE** — Hydraulic down pressure works in any desired combination with rotary speed. Result: Record-breaking, bit-saving production under all conditions.

Let your Bucyrus-Erie sales representative tell you more about the tough, fast-working 40-R, or write Bucyrus-Erie Company, Drill Division, South Milwaukee, Wisconsin.

Manufacturers News

continued from page 144



Gates succeeds father

The Gates Rubber Co., Denver, Colo., announces the death of its president, Charles C. Gates (left), and the subsequent appointment of Charles C. Gates, Jr., to succeed his late father as president of the corporation. Mr. Gates, Sr., was born in Waterford, Mich., in 1877, and in 1904 received his bachelor of science degree from Michigan College of Mining & Technology. From 1904 until 1911 Mr. Gates was active as a mining engineer throughout the West. Mr. Gates had been president of the Gates Rubber Co. since its founding in 1911.

Charles Gates, Jr., came to the company in 1946 after three years in New Orleans with the Copolymer Corp., where he was employed as assistant chief engineer. He worked in the engineering department of Gates until 1949 when he was named a vice president. He became executive vice president of the company in 1958.

Harnischfeger constructing huge overhead traveling bucket crane

A huge overhead traveling bucket crane, scheduled for installation in a cement plant, is now being constructed by the Harnischfeger Corp., Milwaukee, Wis. Featuring a walk-in, pressurized girder design, the crane will have a 22-ton capacity. It will be installed in the Atlantic Cement Co. plant now under construction at Ravena, N.Y. The

cement mill will have a 10-million-bbl. annual capacity. The crane will carry a 7-yd. capacity bucket over a 150-ft. span, and it will feed millions of tons of bulk raw material to the cement-making and processing machinery. Its walk-in design places all necessary operating electrical and electronic equipment inside the main girder of the crane.

Powell named div. mgr.



The appointment of William T. Powell (photo) as manager of its construction machinery section's western division has been announced by Chain Belt Co., Milwaukee, Wis. He succeeds S. Y. Warner who was named western regional manager of the firm's industrial section. In his new position, Mr. Powell will be responsible for all West Coast construction machinery activities for Chain Belt, including equipment sales and administration of the firm's Los Angeles plant. He joined Chain Belt in July of this year and was former chief executive officer of the Emsco Mfg. Co., Los Angeles.

Kaiser promotes Cashin

The election of Frank M. Cashin as president of the Refractories Div., Kaiser Aluminum &

Chemical Corp., Oakland, Calif., has been announced by D. A. Rhoades, president of the corporation. Mr. Cashin has been serving as vice president and general manager of the division, which is a producer of refractory materials used to line industrial furnaces and kilns. Mr. Cashin became associated with the corporation in 1943 and in the following year managed the opening of the company's first Eastern sales office.

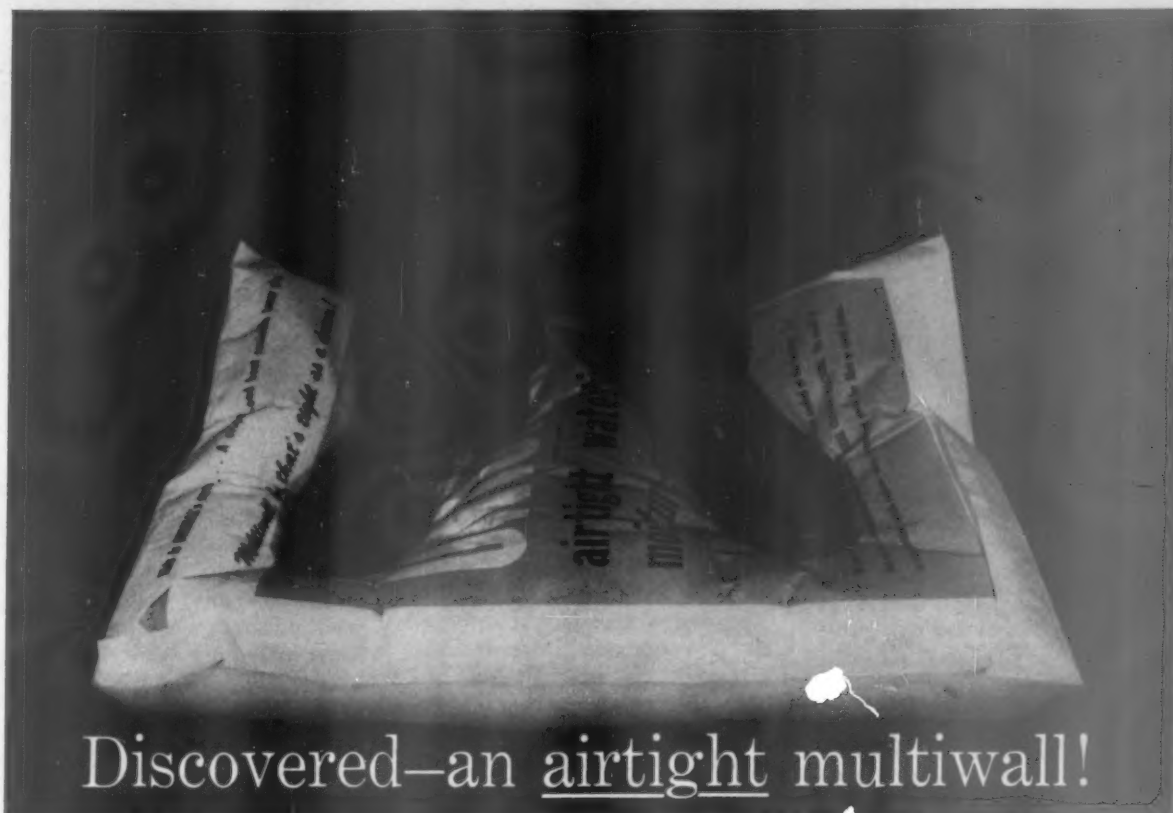
BLH reorganizes sales promotion dept.

The sales promotion dept. at Baldwin-Lima-Hamilton Corp., Construction Equipment Div., Lima, Ohio, has been reorganized to include advertising, technical data and parts catalogue. This combination will establish additional emphases toward distributor, customer and service relations as well as sales promotional materials. Named Sales Promotion Manager is E. J. Fiddles. He also will be responsible for the company's sales training program at Lima. Mr. Fiddles has been with BLH since 1956.

Aeroquip advances Roberts

The promotion of Joseph R. Roberts to the newly created position of director of advertising has been announced by D. T. McKone, executive vice president of Aeroquip Corp., Jackson, Mich. Mr. Roberts was formerly advertising manager, a post he has filled since joining the company in 1954. He came to Aeroquip from International Harvester Co., where he served in various sales and advertising positions. In his new position, Mr. Roberts will have the responsibility for enlarged corporate advertising and various promotional functions.

Please turn to page 148



Discovered—an airtight multiwall!

Simple demonstration helps solve major packaging problem for Dow Chemical

The multiwall bag you see here contains nothing but air. The man standing on it weighs 200 lbs. Yet no air can escape. *That's because the bag is Union-Camp's amazing new UNISEAL.*

It ended a two-year search by Dow Chemical for a package that would provide a perfect vapor barrier.

Protection problem critical

The search began when Dow first developed an effective new crab grass killer. To successfully market this new product, an unusually tight package—even air-tight—was essential. The ideal package also had to be sturdy, printable, easy to handle and ship. And economical.

One day Dow engineers witnessed the UNISEAL demonstration you see above. If the bag could lock in air, then it must have the perfect vapor barrier. Further testing proved they were right.

Seals safely—and saves, too

The remarkable new UNISEAL bag features four plies. An outer sheet of semi-bleached paper (for top print-

ability). Two middle plies of kraft. And an inner ply of kraft laminated to aluminum foil with polyethylene. A final extrusion coating of polyethylene resin over the foil serves as the heat-sealing medium for the inner seam and bottom.

The bag can easily be filled on any standard filling equipment. A special machine heat-seals the inner ply and applies adhesive to the tops of the outer plies. It then folds over the lip and pastes it to the outside of the bag. Finally, the machine centers a



UNISEAL'S unique inner ply is made of kraft paper laminated with polyethylene to aluminum foil. Bags can be easily filled on any standard filling equipment.



Secret of sealing. Special machine heat-seals inner ply, folds lip over and pastes to outside of bag. Finally, gum tape is applied (arrow) forming a positive airtight closure.

strip of gum tape over the edge of the lip to form a positive *air-tight* closure.

Apart from providing a perfect vapor barrier, Union-Camp's UNISEAL bag also turned out to be the least expensive container of any previously tried!

How much could a Union-Camp multiwall idea save you?

Hundreds of companies, large and small, have cut costs through Union-Camp multiwall ideas like this. Our comprehensive packaging service—5-Star Plan—covers bag construction, design, specifications control, packaging machinery and a survey of your plant. And it's free.

See your local Union-Camp multiwall man for complete details.

FREE 16-PAGE BOOKLET shows how packers like yourself have achieved greater economy in their multiwall packaging operations. Write Dept. M-4.

UNION-CAMP

MULTIWALL BAGS

Union Bag-Camp Paper Corporation 233 Broadway N.Y. 7, N.Y.

Enter 1068 on Reader Card

Manufacturers News

continued from page 146



Schild Bantam appoints domestic sales manager

Buel M. Wallis, vice president—director of marketing, has announced the appointment of Vernon E. Pray (photo) as domestic sales manager of the Schild Bantam Co., Waverly, Iowa. In addition to working with the company's domestic distributors, Mr. Pray will also be responsible for the direction of the sales development department. This includes all advertising, sales promotion and sales training as well as a separate market research section. Mr. Pray came to Schild Bantam in 1949 as former head of the sales promotion department of R. G. LeTourneau, Inc.

Pacific Car & Foundry buys Westfall Equipment

To operate in close association with the Kenworth Motor Truck Co. of Seattle, Pacific Car & Foundry Co. has purchased the Westfall Equipment Co., Portland, Ore., and renamed it the KW-Westfall Co.

John G. Holmstrom is president of the new firm. Paul J. Westfall, previously founder, president and principal operating head, is remaining with the new company as a vice presi-

dent and will devote his efforts to sales. Franklin Neff is vice president and general manager of KW-Westfall, and John Magnuson is chief engineer. The company manufactures and offers three basic models of a rubber-tired, high-speed, off-highway 4x4 tractor.

Contemplated merger

The board of directors of The Day Co., Minneapolis, Minn., and Hart-Carter Co., Peoria, Ill., have approved a proposed merger of the two companies. Approval by a two-thirds majority of the shareholders is necessary by both groups to complete the transaction. Under terms of the agreement, The Day Co. name will be retained and the company will be operated as a division of the Hart-Carter Co. Three subsidiary companies of Day: The Day Sales Co., The Day Co. of Canada and Limited & Daycom, Inc., will also retain their present names and operate as subsidiaries of Hart-Carter. No major changes in operating policies or personnel of either company or subsidiaries are presently contemplated.

Schumann named president

Jack L. Schumann has been elected president and a director of Buell Engr. Co., Inc., New York, producers of industrial dust and air pollution control equipment, it was announced by R. F. Palyter, chairman of the board. Mr. Schumann succeeds J. A. McBride, who will continue as a board member and consultant. Mr. Schumann joined the organization in 1946 as a sales engineer. Buell manufactures and installs gas cleaning equipment; electric precipitators, mechanical and bag collectors, dust classifiers and accessories.

Macwhyte appoints assistant manager

Macwhyte Wire Rope Co., Kenosha, Wisc., has announced the appointment of Russell F. Hendrick as assistant Pacific Coast manager. Mr. Hendrick has been associated for many years with the wire rope industry, both with a manufacturer and more recently conducting his own distributorship of wire rope and allied products. He will headquarter at the company's offices in San Francisco, Calif., and will assist Fred M. Sime, who is the Pacific Coast manager.

Research-Cottrell names vice president

Research-Cottrell, Inc., Bound Brook, N.J., announces the appointment of William C. Osborne as vice president in charge of engineering and research. Mr. Osborne, who also becomes a member of the board of directors of the corporation, will be responsible for all engineering and research activities. Prior to joining Research-Cottrell, he was manager of engineering of the Harrison Div., Worthington Corp., Harrison, N.J.

Dodge diesel pulls 130,000 lb.

The first Dodge tractor powered by a Cummins diesel engine has been sold to Blue Water Transit Lines, Port Huron, Mich. The unit features a 12-speed transmission, 15,000-lb. front axle and 38,000-lb. rear axle. Under Michigan axle laws, the unit has a maximum gross combination weight rating of 130,000 lb. The trailer dumps have telescoping hydraulic hoists. The lead trailer has a capacity of 32 cu. yd.; the smaller trailer holds 21 cu. yd.

END

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10' x 11' x 173' Vulcan Kiln, 1 1/2"
10' x 100' dryers, 3/4" shell
9' x 30' Link-Belt Roto-Louvre
8'-6" x 70' Bartlett & Snow dryers
8' x 80' Traylor dryer, 3/4" welded.
8' x 60' rotary kiln, 1/2" welded
8' x 60' Davenport, 1 1/2" welded
8' x 40' Stearns-Roger dryers, 1/2"
7'-6" x 62' kiln, 1/2" welded
7' x 120' Allis kiln, 3/4" welded
7' x 110' Bonnot kilns, 3/4" shell.
6' x 7' x 100' kiln, 1/2" shell
6' x 150' kiln, 3/4" welded
6' x 50' Louisville steam-tube
6' x 50' rot. dryer, 3/4".
6' x 40' rot. cooler, 3/4"
6' x 18' Link-Belt Roto-Louvre
3' x 23' Standard dryer, 1/4"

JUST PURCHASED

1—Marcy #65 ball mill.
1—6' x 150' kiln, 3/4"
1—Allis 6' x 12' rod mill

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Symons 2' standard cone crusher
Symons 2' shorthead cone crusher
Farrel 36" x 15" jaw crusher
Buchanan 24" x 13" jaw, 50 HP
Mitchell 18" x 9" jaw, 25 HP
Babcock & Wilcox #32E ball type pulv.
Raymond #6659 hi-side mill, 250 HP.
Raymond 66" 6-roller hi-side mill.
Raymond 50", 5-roller, hi-side mill
Dixie #5060 hammermill, 500 HP

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PRODUCTS
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8' x 60' x 1/2" Welded Rotary Kiln
6' x 120' x 1/2" Vulcan Rotary Kiln
4' x 35' Rotary Dryer New Shell
4' x 47' x 1/4" Mosser Rotary Dryer
6' x 36' Hardinge Conical Mill 75 HP
8' x 11' Traylor Ball Mill Steel Lined
#5060 Dixie Mogul Hammermill
SX13 Penna. Hammermills, 400 HP
Heil Patterson Crushers, 100 HP
Raymond #50 & #40 Impact Mills
36" x 42" Koppers 2 Roll Crushers
36" x 48"; 20" x 6" Jaw Crushers
3'x3'x12' Horiz.; 4'x9'x12' Vert. Puggers
30"x96"; 60"x84" Screens
Bucket Elevators 45' to 90' Centers
Sweco Separator 48" 3—55 Screens
3'x10' Tyler Hammer Screens 1 1/2 HP
10 Ton Gas/Elec. Locomotive 36" ga.

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RAW END-WET GRINDING

Two 7' x 22' Mills (two compartment)

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Three 7' x 22' Mills (single Compartment)

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Cedarapids BBB 1036 scalper
Cedarapids 4003 Hammermill secondary unit
Telsmith 2636 Primary Crushing Plant
Cedarapids 83 Kubit Breaker. Rebuilt.
Cedarapids 1036 plain bearing jaw
Farrell 8 1/2' x 24' Blake type jaw
Telsmith 40B secondary gyratory
Kennedy 37 1/2' Gearless Gyratory. New Condition
Cedarapids 3023 Hammermill. Rebuilt.
Cedarapids 3003 Hammermill. New Condition.
3—106KVA, 240-480 V. generator sets, Murphy power
Cedarapids 16' open inclined bucket elevator
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Telsmith Vibro-King, 4' x 12', 3-deck screen
Cedarapids 5' x 12', 3-deck-Riprap screen
Cedarapids 4' x 13', 3-deck "AQ" Lime Screen.
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- 2—Bradley-Hercules 60" Mills with 350 HP.
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15 H.P. Motor-Reducer Conveyor Drives
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Penna. CF3-38 Reversible Impactor
Telsmith 36" Standard Gyrasphere
New Eccentric Shaft for 42" Farrel Jaw Crusher

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Telsmith 3 x 10 Triple Deck
Rotex Sifter 5 x 7 Single Deck

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Electric DRAGLINE

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1-7" conveying system pump Type H-7 Elec.
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JAW: Rollins 1424. Buchanan 15x20, 36x42.
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Traylor TTY 4; Telsmith 3', 26".
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37x16, 42x16, Pioneer 40x22, 42x24 triple, 54x24;
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TUBE: Al. Chal. 6x22, 8x12, 8x16, 8x20, 8x24;
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HAMMERMILLS: Penn 30X-350 HP motor. 63K
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Pioneer Port. 2450 jaw 4923 twin roll 36"x30' apron
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Master. CRUSH. Commander, Pioneer 24V Crush-
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2436, 2540, 2836, 3240, 3648, 4240, 4248, 6064
JAW: Allis 6K 532, Telsmith 13A, 40B, 16", 36",
48", KVB 19, 25 1/2", 37 1/2", Traylor 24", 3', 6' GYR.
3, 4, 5 1/2' CONES.
DRYERS: 32x12, 4x18, 4x20, 5x30, 5 1/2"x60, 8x70,
Goodman 1236 Hope Belt CONVEYOR, also 24"x20"
port & 24"x50", 36"x100" staty.
Two 24"x20" McLanahan dbl Log WASHERS.
6" to 16" DREDGE PUMPS, all sizes.
54" x 70" Bird CENTRIFUGE
HOISTS: 200 HP skip, 5 ton Monorail
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Ball.
SHOVELS: NW35, 6, 80D Lorain L50, 75, 820,
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7200, Manitowoc 2000B, 3500, 4500.
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7"	4	32 oz.	1/32" x 1/32"	\$1.71
9"	5	32 oz.	1/32" x 1/32"	2.44
12"	8	28 oz.	1/16" x 1/32"	2.31
12"	6	36 oz.	1/16" x 1/16"	4.02
14"	4	28 oz.	1/8" x 1/32"	3.13
16"	4	28 oz.	1/8" x 1/32"	3.28
18"	3	28 oz.	1/16" x 1/32"	3.09
18"	4	28 oz.	1/8" x 1/32"	3.63
24"	3	28 oz.	1/16" x 1/32"	3.84
24"	4	28 oz.	1/8" x 1/32"	4.49
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36"	4	28 oz.	1/8" x 1/32"	6.53

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a minimum of maintenance. Sand, Gravel,
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